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STATISTICS IN MENTAL HEALTH PROGRAMS

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NATIONAL INSTITUTE OF MENTAL HEALTH-MENTAL HEALTH STATISTICS

STATISTICS IN MENTAL HEALTH PROGRAMS

SELECTED PAPERS FROM ANNUAL MEETINGS OF THE NATIONAL CONFERENCE ON MENTAL HEALTH STATISTICS

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PREFACE

The National Conference on Mental Health Statistics meets annually under the sponsorship of the Biometry Branch of the National Institute of Mental Health. The purpose of these meetings is to provide a forum for discussion of statistical activities in local, State, regional, and national mental health programs. Participants in the meetings include not only statisticians from these mental health programs but also program administrators and clinicians who are concerned with the development and use of statistical data in program planning, control, and evaluation, and in patient care and management.

The proceedings of the conferences are of interest not only to those who participate in the meetings, but also to many other mental health program professionals who are not able to be present. This publication, then, is for the purpose of disseminating and making more widely available the results of the conferences; and it also supplies a useful record and report of the meetings' substantive information content.

The programs for the annual meetings of the conference are planned by an advisory committee of State representatives and NIMH Regional Office and Central Office staff. The meeting time is devoted to the consideration of current problems relating to data collection, processing, analysis, presentation, and use in mental health program management and in biostatistical and epidemiological research. Twelve papers from the 1967, 1968, and 1969 meetings have been selected for publication in this report. Other papers, equally as important, were presented at these meetings but are not included in this report for various reasons, such as the reference to large numbers of illustrations; publication in other sources, etc.

The staff of the Biometry Branch is indebted to each of the conference speakers and to members of the advisory committees who worked on the difficult task of designing timely and interesting programs on the conference topic, "Statistics in Mental Health Programs."

Cecil R. Wurster.

COMMUNITY MENTAL HEALTH STATISTICAL PROGRAMS OF THE FUTURE

Bernard L. Bloom, Ph. D.

University of Colorado

Many of you, I am sure, are familiar with the challenging vision of tomorrow's mental health statistician enunciated by Morton Kramer in his 1966 paper entitled "Mental Health Statistics of the Future." While I must confess some initial surprise in seeing the paper published in *Eugenics Quarterly,* in a way it seems altogether fitting. Eugenics is the science of improving the qualities of the human race, and it may very well be that the mental health statistician will contribute to that goal, just as the vital statistician has helped in the battles for reduced morbidity and mortality from the nutritional and infectious diseases and for the extension of life expectancy.

The Kramer paper concerns itself with the nature and content of mental health statistics of the future and is written from the point of view of a "Federal program, located in the National Institute of Mental Health, responsible for the collection and analysis of data on the mental health of the Nation." (Kramer, 1966, p. 186.) What I would like to do this morning is to discuss with you some notions about the roles of mental health statisticians of the future "in the best of all possible worlds," from the point of view of the local community rather than from the national level.

At the outset it is important to note that statistical programs must have some specific objectives of their own—they can rarely satisfy everyone. Local mental health program directors have the problem of examining national statistical reports and trying to make use of them in terms of their programs. National statistics, so crucial for presenting the national mental health goals and problems to the U.S. Congress, seems sterile and far removed from the urgent problems in the local community. Interstate differences in mental health statistics are very difficult to interpret. Admission rates, readmission rates, average length of hospitalization, staff-patient ratio, cost per patient per day, even figures specific for age or sex or diagnosis seem irrelevant to local program directors who are interested in improving quality of services. For these figures tell us little about treatment effectiveness, or the mental health of the community, or the local sources of psychopathology, or what happens to patients as they try to reintegrate themselves into the community structure. We can similarly expect that statistical programs organized to be directly responsive to local goals and problems will be difficult to utilize at the national level. National statistics must rely on nationally agreed upon definitions and categories. There would be no way to summarize and present national trends if the source data consisted of a series of statistical reports uniquely tailored to unique communities. But since there are so many here who speak eloquently about the national interest, I believe I can play a useful role by focusing on local mental health programs. Obviously, the interests of local and national mental health programs coincide at many points, and I would hope, therefore, that these remarks will have some general relevance.

It is well to remind ourselves that what is happening in mental health program philosophy in the United States is part of an enormous social awakening. The failure of the American mental health establishment to deliver effective services where and when needed has been recognized. Indeed, the failure of many of our general health and welfare programs has been acknowledged. With these admissions has come a profound rise in the social responsibility of our attitudes toward health, education, and welfare, a significant move toward the integration of all health services, and specifically a growing sense of urgency regarding improved mental health services (see Bloom, 1967).

One of the calls to arms has been the word "comprehensive." The term is often not clearly defined. What I want to do is try to show how a definition of this term can set the stage for looking at the tasks which face the community-based mental health statistician. A comprehensive mental health program must have at least six characteristics. First, it must be focused on the restoration and maintenance of mental health within the limits imposed by the available knowledge at our

disposal. Second, it must concern itself with prevention in the widest sense of that term. It must prevent the occurrence of all preventable mental disorders; it must avoid prolongation of emotional disorders by providing prompt and effective treatment; and it must reduce the frequency and severity of disability associated with emotional disorders. Third, it must provide continuous service, in health as well as in sickness, and at all stages of the disorder rather than only at its most severe. Fourth, it must be person-centered rather than organ-centered, paying attention to the interdependence of mind and body, to the interrelationships of environmental factors with interpersonal factors and to the behavior of the individual in health and when under stress. Fifth, the program must concern itself with sufficiency of services, providing that amount of service of all kinds necessary for the population to be served, and served promptly, and sixth, the program must emphasize quality of service as well as quantity of service. I'd like to comment now on certain aspects of this definition in terms of mental health statistics.

If the statistician is to help develop a comprehensive mental health program, he must concern himself with extending the limits of knowledge. It is no longer sufficient for him to spend all his energies in collecting and reporting on program activities of last month, or last year, or of 2 or 3 years ago, depending on how far behind he is. He must also be in front of mental health programs. A month or two ago I had occasion to review the statistical methodology associated with developing an abridged life table. I got bogged down at one point and had to yell for help. One of the places I called was the Department of Preventive Medicine at the University of Colorado Medical School. I vaguely remembered reading an announcement that a biostatistician had been added to their staff. When I finally tracked him down and told him my problem, he replied, "I'm not that kind of biostatistician." What he meant, it turned out, was that he was a consultant to the medical school at large, helping them in the development of research studies and in the strategies for the analysis of data. Community-based mental health programs, it seems to me, need statisticians who are also "not that kind of" mental health statistician. Our programs need people who can combine the skills associated with program monitoring with the skills associated with both basic and applied research designed to extend the limits of our knowledge.

If the statistician is to help develop a comprehensive mental health program, he must be alert to the whole range of the program, to its full range of preventive activities. In this context there is an absolutely exhilerating range of challenging activities. In the field of primary prevention, the mental health statistician can engage in two related activities. First, he can help identify groups of people who are unusually vulnerable to the development of emotional disorders for which community services would be desirable. He needs to study the extent to which emotional disorders are associated with other kinds of social disequilibrium, or with normative crises such as retirement, pregnancy, or family deaths. He needs to ascertain whether there are significant mental health consequences associated with divorce, suicide attempts, loss of employment, community disasters, accidents, or school dropouts. He needs to be alert to the extent to which emotional disorders are unusually common among neglected and battered children, among the children of psychotic parents, among those who suffer from chronic illnesses, among the culturally deprived and the racially or religiously discriminated, among those who come in contact with the courts, with welfare agencies, and with health facilities. In addition, the ecology of emotional disorders needs to be investigated. What are the characteristics of the neighborhoods from which come our patients? In this connection, census tract information is invaluable and later on this morning I would like to give you an example of a study of this kind (see Bloom, 1966.) In short, the mental health statistician needs to have his fingers squarely on the pulse of the clientele, searching clinical case folders as well as tabulated identification data for possible sources of psychopathology in the community.

Second, having established possible foci of psychiatric description, the mental health statistician needs to help, and perhaps take the leadership in the development of a series of alerting mechanisms. If it can be shown that a parental death is significantly disruptive to children of school age, for example, then an automatic alerting system should be established which would identify such children when a death occurs. In this way a preventive intervention service can be provided through the schools. If emotional disorders are unusually common within a month or so after retirement, an alerting system in cooperation with local employers can trigger an anticipatory guidance program or can provide consultation for the establishment of such a program. One recent special study from the Biometry Branch has shown the increased risk of psychiatric hospitalization of women with four or more children in contrast with those with smaller families. Here is another high-risk group which can be easily identified for whom special preventive services can be designed—perhaps nothing more complicated than an annual 2-

week vacation away from the children. The mental health statistician can help establish a flagging system to make this possible.

Regarding secondary prevention services, that is, the prompt identification of cases of emotional disorder and the prompt provision of appropriate treatment, the community-based mental health statistician can collect several pieces of most useful information. First, by what pathways do patients arrive at the service facility? Can the traverse of his network be made more efficient or more rapid? Second, how long is it between the felt need for service and the petition for service? Can this time interval be reduced by some form of mental health education, for example? Third, how long is it between the petition for service and the provision for service? Can the waiting list be reduced? Can triage and emergency service programs be introduced to reduce the waiting time? Fourth, what about patients in need of help who never petition for help? Can improved case finding services be inaugurated?

In the area of psychiatric rehabilitation or tertiary prevention, the mental health statistician can study the flow into the community of patients discharged from State mental hospitals and other extra-community facilities. What followup services need to be provided? With what frequency is it found that failure to provide suitable rehabilitative services results in a failure to make a satisfactory adjustment to the community? Just as a flagging system can be established for primary prevention services, so a community mental health center can be alerted to the return to the community of a psychiatric patient treated elsewhere. Regular reports to the clinical staff of the degree of their success in promptly reaching patients in need of all forms of service can be a most useful kind of document, and the mental health statistician can take major responsibility for the preparation of this report.

If the mental health statistician is to help develop a comprehensive community-based program, he must be concerned about continuity of care. This implies a kind of record system which can be sensitive to failures in the caretaking network to provide service on demand, to missing components in caretaking network and to unnecessary losses of patients within the network. We are talking here about a conscientious program of human accountability. We know from studies conducted in the Boston area that half of the patients referred from one facility to another never get to the other facility, and half of those who get there do not get definitive service. These kinds of slippages in a mental health program system exist in part because we are not made adequately and forcefully aware of them. As an accountant of the continuity of services provided to our clientele, the mental health statistician can be in a key position. And as a diagnostician of the failures in continuity of service, he can be even more useful. What proportion of patients referred from a particular facility to a particular facility get there? What reasons appear to account for the failure to arrive? Could special provisions be instituted to increase the arrival rate? For those patients who arrive at the facility to which they are referred what was the disposition? If the facility could not provide service, was a secondary referral made? With what success? Could a preliminary telephone call by the original referral source have increased the likelihood that the patient would receive service when he arrived? Answers to these questions, among others, can be provided and can help program directors in developing a group of services in which deliberate continuity of care is encouraged and reinforced.

The mental health statistician is in an excellent position to study the sufficiency of services available in a community. What is the range and extent of mental health services available in the community? Where are there waiting lists? Are there facilities which are able to provide a greater amount of service than is demanded of them? Do certain facilities have intake policies which seem to limit unnecessarily their capacity to provide service? If all the available facilities in a community were functioning at their most efficient rate, what would be the capacity of the entire network to absorb new cases? Does this capacity match the rate at which new cases appear to be generated? If not, where are the bottlenecks and how can they be corrected? For what kinds of patients are sufficient services particularly difficult to obtain? If new services are needed, where would be the best place to locate them and what should their intake policies be? This is mental health program planning at its most fundamental level, and the statistician can assist in gathering the facts on which to plan.

Finally, I want to talk about the mental health statistician's role in the enhancement of quality of service. I know of no area more in need of systematization than the measurement of treatment and program success. As budgets become larger and as manpower becomes scarcer in relation to the population at risk, the need to evaluate effectiveness increases in urgency. The issue is simple. What is your mental health program trying to accomplish and how successful is it in accomplishing it? I do not need to remind anyone here that the Federal Government, in collaboration with States and local communities, has embarked on a grand experi-

ment in the reorganization of mental health services in this country. This grand experiment is just that. It is most certainly not the consequence of empirical studies which were designed to evaluate various approaches to providing psychiatric care. It represents a philosophy and a strategy and both the philosophy and the strategy are thoroughly unevaluated. The philosophy is to keep patients functioning in normal family and work roles insofar as these are relevant and possible. The strategy is the community mental health center—an omnibus agency in the community. Some of the consequences of this strategy are fairly clear—the community general hospital rather than the State mental hospital will become the focal point of mental health services, many State mental hospitals will be converted into community-oriented comprehensive service centers, and the center of gravity of mental health practice will likely move somewhat closer to the medical physiological end of the physiological-psychosocial continuum. I am enormously enthusiastic about this philosophy and strategy not because it is so imaginative or so likely to be successful, but because it may lead us closer to the only real hope in the field of psychiatry, namely effective primary prevention. As presently conceived, the federal community mental health center movement is designed essentially to improve the organization of the delivery of a relatively traditional complex of services. We have heard repeatedly about the five anointed services: inpatient care, outpatient care, partial hospitalization, emergency services, and consultation. I cannot help but wonder how the course of American psychiatric history might have been changed had the five required services of a community mental health center included, for example, goal and time limited individual and group counseling, anticipatory guidance and crisis intervention, social system analysis and modification, analytic and experimental epidemiological studies, and mental health program evaluation.

There is some research coming out of Los Angeles County Hospital which suggests that psychiatric aides are as successful as psychiatrists in providing meaningful help to hospitalized patients, that treatment of whatever kind is not demonstrably better than no treatment at all in helping psychiatric patients recover their promorbid level of adjustment, and that virtually all psychiatric hospitalizations are unnecessary. While our professional sights are clearly set toward the comprehensive community mental health center, from a research and evaluation point of view we are in a period of extraordinary turmoil. In a state of programatic turmoil, one solution is facts, and mental health statisticians must help in gathering and interpreting those facts.

Just what are the facts which need to be gathered in order to evaluate the quality, that is, the effectiveness, of our mental health services? The facts must concern themselves with measuring the extent to which program objectives are being attained. And this means that there have to be some explicit objectives. I have talked to this point on other occasions (see Bloom, in press) and rather than pursue this road today, let me suggest that there also needs to be a systematic evaluation of individual clinical objectives, that is, of the treatment success with respect to each patient who comes in contact with our care-giving system. It is this kind of evaluation I would like to talk about today. If you walk away from this session with one new idea, I hope it will be this. At the end of every diagnostic evaluation made of a patient when he is first seen in a clinical facility and accepted for treatment, two questions must be always asked: (1) what objectives will you have in treating this patient? and (2) by what signs will you know that you have achieved these objectives? It simply won't do to evaluate mental health programs by some global service statistics such as the extent to which hospitalizations or rehospitalizations are prevented or shortened. Hospitalization is often the best thing that can happen to a patient and to deny him hospitalization is to behave in a most cavalier fashion. Prevention or shortening of hospitalization can be accomplished simply by administrative edict, and I have the impression that this is often exactly what is done. The real question is what happens to the individual patient in the community or to the sum of the psychopathology in the community as a consequence of, for example, reducing length of hospitalization. We must remember that troubled people have been denied psychiatric care for years, particularly if they couldn't afford to buy it. It is no new discovery in the mental health field that patients survive if they are not treated, or treated briefly, or treated here instead of there. Statistics on admissions and discharges and on length of hospitalization, whether for the total population or by age, type of facility, or diagnosis tell us virtually nothing about the quality or effectiveness of our services. Even when such statistics are collected over time so that we can point to trends, we really know very little about any changes which may be occurring in incidence or prevalence, or severity, or duration of the major emotional disorders with which we are concerned.

But imagine, if you will, a community mental health program in which these two questions are answered for every patient at the start of his treatment—what are

you trying to accomplish with this patient, and how will you know if you have accomplished it? The stage is now set for a major and definitive study of treatment effectiveness based upon unique patients each with unique treatment goals. I suspect that these studies will be very useful at the national level even if they are conducted somewhat differently from community to community, even if there are no standardized definitions and categories of treatment objectives, or standardized lists of signs of treatment success. As a matter of fact, I would urge each clinician to state his objectives in his own words, and if he doesn't know why he is seeing a particular patient, let him say so. Similarly, let him state the evidence whereby he will judge the success of his clinical work in his own way, and again, if he doesn't know how to judge it, let him say so. To begin with, in the case of clinicians who do not know why they are seeing a patient, or who do know more or less where they are heading but don't know how to tell when they get there, we are dealing with clinical activities which cannot be evaluated and we might just as well admit it. It is up to the professional staff or to the program director or to the lay advisory board, or the county commissioners to decide what to do about this state of affairs. They could decide to tolerate it, to encourage it, or to minimize it. But it may be a sobering realization to such clinicians to know that their work with respect to some particular patient cannot be evaluated—they have undertaken the treatment of a patient with entirely unspecified goals, or with goals stated so abstractly that they cannot pin themselves down to any observable points of reference in order to determine the extent to which the goals have been achieved.

If objectives and signs can be specified, however, we have the following happy state of affairs. Every month each clinician can be quizzed with respect to each of his active patients. "Are these reasons which you mentioned a month ago for seeing this patient still applicable?" "Are these signs which you mentioned a month ago as the ways in which you would determine treatment success still applicable? If not, with what objectives in mind are you now seeing the patient? What indications would you now use to determine success?" For every closed case each clinician could be asked to what extent the desired behavior changes actually took place and some parallel assessment of degree of improvement at the time of discharge. Because the signs of improvement are observable, they are subject to verification. Clinicians could also be asked about behavioral changes they might anticipate appearing in the future, and these could be verified at a later date. Now here are some of the types of analyses which could be made on this data either directly or indirectly related to quality of care:

1. What is the general nature of interclinician reliability or agreement in the establishment of treatment goals?
2. In the case of patients for whom there are particular treatment goals, what is the nature and range in the types of behavior deemed suitable to be used to index goal attainment?
3. Are there any changes over time in the treatment objectives of clinicians?
4. What patient or therapist factors are associated with the ability to establish treatment goals and objective signs of success?
5. Are treatment goals related to diagnostic characteristics of patients or to judgments of severity or chronicity?
6. Are certain treatment goals easier to achieve than other goals?
7. In what proportion of cases are treatment goals attained, for how long and at what cost?
8. What patient characteristics are significantly related to the achievement or failure in the achievement of treatment goals?
9. What are the consequences to the goal setting process of a feed-back system in which clinicians are informed regarding the general degree of success of their various treatment goals?
10. Are there any significant differences in degree or duration of goal attainment as a function of various types of mental health treatment programs? Are certain goals more easily accomplished by State hospitals than by community mental health centers? Are other goals more easily accomplished in the community? Are certain goals achieved without treatment as easily as with treatment?

In my judgment, success in accomplishing the objectives of a mental health program must be measured primarily in terms of success in achieving service objectives with each client in the system—whether the client is a patient, a relative of a patient, or a consultee. There are, of course, programmatic objectives in addition to clinical objectives and perhaps at another occasion we can talk about their evaluation. But the study of clinical objectives and their vicissitudes must proceed or go on concurrently with the study of program objectives.

Well, all this is a tall order for a mental health statistician. I have described a person who is part statistician, part research consultant, part demographer, part ecologist, part epidemiologist, and all

scientist. This formulation may, in fact, be entirely unrealistic and perhaps even visionary. But dimly sensed visions of the future can help us in planning programs in the present. Obviously these expanded roles for mental health statisticians have implications for manpower and for training. We need more and better people. We need specially prepared teaching materials, perhaps assembled in book form. Training programs in academic settings as well as inservice training programs need to be generated and expanded. Academic programs such as the one shortly to be started in the Department of Biostatistics at the School of Public Health at the University of North Carolina under the direction of Bernard Greenberg need to be supported and encouraged. Continuation education programs such as the Western Conference on Uses of Mental Health Data under the superb leadership of Charlie Pettus, or the more senior Southern Regional Conference on Mental Health Statistics under Harry Williams' able and dedicated leadership need to be extended into other areas of the country as well as extended in scope. Program directors of hospitals and of community mental health facilities as well as State mental health authorities need to be involved in the concerns of mental health statisticians for it is through them that your staffs will be expanded and upgraded. And we have to make sure that our work is not ignored because it is ignorable.

There is no doubt that we are entering a new era in the organization of mental health services and in the integration of mental health with general health programs. If this new era is not to suffer the same ignominious fate as the great hopes of the past—bromides, lobotomy, child guidance clinics, hydrotherapy, insulin, State mental hospitals, perhaps even psychoanalysis, we have to help in erecting a solid empirical foundtation to our program efforts. We need data thoughtfully collected and analyzed and intelligibly presented, responsive to the tasks of mental health program planning and program evaluation. I hope that all of you will be able to play an increasingly important role in this endeavor.

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DATA SYSTEMS AND THEIR APPLICATION TO CURRENT MENTAL HEALTH PROGRAMS

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In looking at some of the current efforts and current applications of mental health data systems, it might be well to trace the development of most of our state mental health data systems. It was just a shockingly short time ago, it seems to me, no more than 20 years, that there were no substantial requirements any place for any kind of broad census data in the mental hospitals and institutions for the retarded. Census data was about all that was available at the institutions for the mentally retarded; and virtually no reporting out of clinics.

The only substantial use made of anything available, and this was largely just crude census data, was to divide the census data figure by the number of days in a year into the budget figure to determine the institution's per diem. If the figure was low, the superintendent could brag about how much taxpayers' money he had saved. I know of one superintendent who not more than 15 years ago publicly bragged that his institution's per diem cost had never exceeded 90 cents a day. Imagine, food, clothing, shelter, and treatment for less than 90 cents per day per patient. And this was less than 15 years ago. This was the kind of application we had for mental health data systems 20 years ago.

With the establishment of the National Institute of Mental Health, a greatly increased stress on reporting of certain data regarding movement of patients, age, sex, and diagnoses, came into being in mental hospitals, schools for the mentally retarded, and mental health clinics. In order to speed the reporting of comparable data from State to State, there was established the Model Reporting Area for Mental Hospital Statistics (MRA). State membership in the MRA required the use of common definitions, common reporting periods, and common reporting forms. Then, at last, it was possible to get some reasonably trustworthy comparisons of patient movement, diagnostic patterns, and costs from State to State.

At this time we saw the publication by the staff of NIMH of several articles based on these data. These gave us a much clearer picture for the first time of the national mental health picture, but I think back home, in the individual States, the States made very little use of this data within their own systems. However, it was at this time, with the start of the MRA and the national level of interest in mental health data that mental health statistics units came to be established in State departments of mental health.

In those early days, the main purpose in having a statistics unit, it seemed to me, was to gather and prepare the data for the Federal reports. No one quite knew what to do with the statistics once they were compiled, other than to send the required forms to Washington.

No one in the department at the level of program administrators or clinicians really understood the mission of that small, windowless, inside office that was crowded with file cabinets. All they knew was that the statistician stayed in there hovering over a clattering IBM–101, while a glassy-eyed clerk sat off and gang-punched zeros into stacks of IBM cards, but nobody really knew what this was all about. They did things over there and sent the reports in to Washington, and in time you got a report back out of Washington, a year and a half later, of what all this data was about.

Of course, you could still divide the total expenditures by the average census figure and come up with a per diem figure as you did before the system was established but by this time an early form of creative federalism was already doing this as part of national reporting.

One new and useful application of mental health data did come out of these early machine systems. The program people occasionally called on the statistician in his small, windowless office to do some kind of special runs of data to help them make various administrative decisions about such matters as whether to

shift certain counties in the hospitals' catchment area, to another hospital district, or whether the alcoholic admissions could be accommodated in ward 19 or would have to take over ward S because there were too many of them, and ward S was a larger ward, which was really needed by the hospital for old ladies (females, 65 and over). In this way the new statistical data system did find a new use; namely, doing special studies. They were sporadic but important studies used in programing within the States. In most cases, the statistician had no previous inkling that a request for data was to be made. The request simply showed up in a memo. The data were gathered from the cards and sent off with no further word of it. The statistician was seen only as the deus-ex-machina who could twist the tails of all those IBM contraptions and come up with appropriate tables and figures in response to the memos.

It almost never occurred to anyone in the Department that the statistician might be initially involved in planning and analyzing what data would be needed to arrive at the solution to the problem. Generally, I think the statistician was perceived to be like the bird in the cuckoo clock and came out only when the Federal hand passed the fiscal 12 and announced the number for that year's report.

When I got to New York a whole new concept of what a statistician might be and might do came to me in seeing the way the statistician operated in relation to the statistics program there. In New York I would not have considered having a meeting of something like our policy committee, which met weekly, without having the statistician present where he could feed in some of the insights that he already had from his knowledge of the trends and patient movement and everything else in the system. He could frequently help us formulate the questions better, and frequently had answers already available from his knowledge of his system. He sent a message downstairs and could come up with the right answer right off, on the spot. It wasn't a matter of waiting until the meeting was over and sending a memo down asking for the answer to the question. The idea of having statisticians in as part of the planning mechanism of the ongoing operation was something that had really not occurred to me before. My statistician in Kentucky sat in on our regular biweekly staff meetings of the Department; but in terms of detailed kinds of planned activity, I'm afraid it was some of the rest of us in the Department, administrative people, and program people, who sat down. If we thought of something we wanted out of that data system over there, we would send a memorandum over and get that. I think this question of application of data systems in most places depends on the role of the statistician, what is in his system, and what capacity he has for using it.

As the years moved on our IBM machines became larger, faster, and more versatile. Now we have the biggest "gee-whiz" of them all—the computer. It is my understanding that most computers in use today in business, industry, and in Government are used almost exclusively to handle one of two kinds of data problems, one to provide speed and the other to process a large quantity of data. Perhaps the major use made of them by mental health departments is to provide for handling of the large quantities of data that are accumulated on our thousands of patients.

More recently, program administrators and clinicians have come to realize that the same ability of the computers to handle large amounts of patient data may be used in other data systems, such as personnel, payroll, fiscal, inventory, and facility data. In most States each one of these data systems is set up as a separate system and tends to remain very separate when the various systems are put on computers. In only a very few places do we hear talk of establishing linkages between the various data systems. Essentially we are doing very little more than when we were in the punch-card machine days, and yet the computer, in addition to its ability to rapidly handle large amounts of data, also has the ability to show relationships. This requires much more sophisticated planning and programing than most of us are now prepared to give, but it remains as a tremendous possibility which we should explore and develop. For example, in New York, before the computer was to be used a lot of planning was done in this area, and one of the applications, for instance—I'm sure dozens more have been added—was a mechanism which, when a patient came in on an order for some sort of action to be taken within a certain period of time, fed this information into the computer and the computer listed it for outgo on a list of patients for whom some action had to be taken 10 days hence or something, so this could be fed back to the hospital. Here was an example of the computer being used in a way to do something for you other than just tabulations and a question of speed, but this sort of thing is really extremely rare.

What is the role then of the current mental health patient-data statistician? At present in most places it seems to me his role remains pretty much unchanged from machine days. He is still too often the bird in the cuckoo clock who makes up the Federal report, and who responds to memos from the administration. He

seldom has any firm notion about what goes on in those other data systems of his program—personnel data, fiscal data, inventory data, etc. He often does not see himself, nor is he often seen by others, as having any broader role to play in the Department's program than the one he now plays.

What are some of the consequences of this? The most unfortunate consequence is that the data now available is not being used to anything like its potential in developing our programs of patient care, prevention, and rehabilitation. In addition, our data systems tend to be static rather than constantly evolving to greater levels of usefulness. Finally, our data systems remain essentially unrelated to existing program operations. Program people are not really using our data systems for monitoring operations, for development, for evaluation, etc., as they really might be used.

But just what should be the applications of data systems to mental health program operations? A certain research or evaluation function is implicit in any program's operation. A systematic collection of data, analysis and presentation, having as their main purpose helping administrators to obtain and spend money wisely and effectively in managing the problems of prevention, treatment and rehabilitation of emotional disturbance, and mental retardation. In an operating agency this data collection, analysis and presentation function serves essentially five purposes—

First—surveillance,
Second—recordkeeping,
Third—evaluation,
Fourth—development,
Fifth—basic research.

To some extent, as we move from surveillance to basic research, we go through increasingly complex and sophisticated data systems, but this is exactly what our data systems should be doing—steadily evolving into more sophisticated and more useful systems. It is necessary to start at simple levels, but let us not be content to stay at those levels. Let's look a little more specifically at these items. *Surveillance* involves determining the size, nature, and extent of the problems we are attempting to manage. As with all data systems, we cannot hope to cover every aspect of the problem. We must be selective of what items we keep accounts on, but these systems should be steadily improved, increased, and developed from these simple things. We need to look more at community needs and activities. Most of our current patient data systems in the mental hospitals, schools for the retarded, and clinics are concerned only with those who are admitted to the facility, making no attempt to tell us anything about the extent of problems in the community.

Perhaps if we developed reporting systems for cases about which we consult but do not actually see or admit to our services we could formulate some notions about the dimensions of the problems in the community and which portions of the problems we are actually serving in our programs. Furthermore, consider that our categories of patients and the movement are presently quite crude; the diagnostic categories have been flayed many times before because of their vague and varying use, but still we use them. There has been some work done with categories of presenting problems or symptoms rather than, for instance, diagnostic categories, but this still remains largely an experimental kind of activity. It seems to me this kind of thing will provide a step in the direction of increased specificity and sophistication. I think the kind of program WICHE (Western Interstate Commission for Higher Education) has with their mental retardation data system furnishes them with a great deal more information about the pressing problems of kids in their 13-States' institutions, such as the kinds and extent of the problems, the numbers that are bedfast, ambulatory, toilet trained, etc. This computerized reporting is a step in the direction of increased sophistication; and at times maybe they have felt they made the system so sophisticated it overwhelmed them with bits of information they did not quite know what to do with, but nevertheless the kind of stuff essential to know, in a more sophisticated way, about the extent of the problems with which we are dealing. For instance we all know there have been increases in the numbers of children and adolescents coming into our hospitals. The surveillance has made us aware of this. We know there are more alcoholics coming in, and that syphilitics have almost disappeared. Our program should be retailored in terms of these different kinds of problems that we are trying to deal with, if the system is really doing its job in surveillance.

The second objective is *recordkeeping*. This involves data about the program's operation and the outcome of its efforts. Here, too, some decisions about what data to keep must be made, depending on program and administrative needs and outside demands such as budget officers or legislatures, etc. The recordkeeping functions should also be constantly improved and developed. For instance, presently almost no data is kept on treatments given or rehabilitation measures taken. Treatment data simply is not in our system. All we know really is length of stay and some vague comment about improved or unimproved, which really

does not tell us much about outcome. These are probably the levels at which we need to begin, but isn't it time to move to greater sophistication at this point? Particularly the treatment data should be added to our data systems, and outcome should preferably be in terms of the problems presented (that is, what have we actually done in terms of the problem presented) rather than in terms such as improved or unimproved.

I think it significant that most of our data today is called "patient movement data," for that is about all that it is. It certainly is not treatment data or outcome data or any kind of clinical data, but we should have this kind of information if data systems are going to be maximally useful. Very few of our State mental health data systems have currently evolved much beyond the rather rudimentary stages of these first two functions—surveillance and recordkeeping. These are essentially what our systems are doing at this point.

The next data function is evaluation which should be a major application of any data system. This function requires the setting of some specifications, what we intend to do, and a certain rigor in the gathering of data. Too few program administrators, psychiatrists, and other clinicians, are aware of the possible uses of data systems for evaluation. It appears that maybe the same thing is true with statisticians.

Obviously, if data systems are to be used for evaluation, program people and statisticians must work together to set the specifications and to apply the data-gathering approaches. Who should take the lead in this? Sometimes statisticians argue that this is not a proper role for a statistician, and in a technical sense they may be right—a statistician's training is formally only in statistical procedures, not in their use. The same argument, of course, might equally hold true for psychiatrists, psychologists, and others who administer the programs. They are trained in clinical psychiatry, clinical psychology, and not trained in program evaluation nor administration. But somebody has to take the lead in this. I don't know who it should be, but would like to see it more often be the statistician. Evaluation also evolves a degree of sophistication.

The significant steps in evaluation are, first of all, setting the objectives of the program in some fashion that can be measured. At first these objectives are going to have to be arrived at by some kind of concensus which is refined to more ultimate levels. When you sit down with your clinician and talk about what our goals are going to be for alcoholics—is it going to be sobriety, drying them out, some sort of treatment, or some kind of control of the drinking but not absolute abstention? You have to have some kind of goal and some notion of how many people you plan to treat in the course of a certain period of time. These kinds of objectives need to be set. As a second step the input and output variables have to be determined. Initially these will probably be very simple input variables of staff allocations of services, number of psychiatrists on the service, number of psychologists, etc., but later they will be evolved into more sophisticated time and effort variables.

Output variables will also evolve from very primitive concepts, such as "released" to something such as "successful employment" or "independent social living." We will also have to have other more sophisticated measures of successful outcome. A concensus on the ways to measure these variables has to be reached. What kind of criteria are we going to accept as the standard for successful employment, for instance, or independent social living? These criteria will initially be judgmental and crude, but later they should evolve into more systematic and formal measures as time goes along.

Moving on to *development,* we use the data systems for planning of projects and programs largely that do not now exist or that are being substantially modified. The steps we use are a combination of those listed under surveillance and recordkeeping and evaluation, with the exception that here is an opportunity to practice intervention research, to institute a new program, and to measure its step by step progress to productivity and efficiency. It comes closer to the experimental research model, in that you can have some controls. You can start this in certain hospital districts, schools, or programs and not in others, so you have some measures of what would happen if you did nothing compared to what you are doing in the system in which you are intervening. But the data system has to be set up to report its data back to the administrator at very frequent intervals so that he knows whether he is coming close to his goal or not, and what in the system needs to be changed or modified in order to help him reach the goal.

In *basic research,* the researcher tries to use the data system to see beyond the immediate problems to more fundamental problems. The research is based on rather carefully formulated theory, not just on trial and error observations. Most operating agencies do not support this kind of basic research in their regular operations, but it is the kind of use of the data system which may ultimately have the greatest payoff. This level of basic research obviously requires an interested and motivated clinician who can develop the theory or hypothesis and the method for testing it. The

statistician should be involved in the planning and analysis of the data as well as in its collection.

In basic research, as in other functions of data systems, we must expect to make a beginning at a fairly primitive level and gradually evolve to more sophisticated development of such data. This basic research is usually performed in a university or clinical setting where the experimental model can be developed with appropriate controls and control of variables. There is usually no analysis or reporting of data to anyone until the experimental period is completed. Then the data is tabulated and analyzed, and the codes revealed to complete the experiment. The report is written and sent to the administrator for publication. It is only when this final report is revealed that its failure or success is known and why it failed or succeeded. Unlike the development model where the data is constantly reported back for comparison with specified goals so that program needs for modification can be made as you go along; this experimental approach has limited value for the administrator as a regular reporting mechanism, since the data is revealed only after the experiment. It is very valuable in answering certain basic questions about treatment procedures and the like, but data systems should be prepared to participate in experimental research of this kind.

In all of these functions of data systems, we must remember that our patient systems are essentially concerned with what most systems analysts would call the output portion of the program; that is, the services we are rendering to people and the kinds of adjustments in outcomes the people have. When we focus exclusively on this part of the program, we may be able to tell something of the outcome or effectiveness of our program in terms of the people served, especially as our measures become more sophisticated; but until we include the input data—personnel, budgets, equipment, and facilities—we will never be able to decide the efficiency of the whole mental health program. We may be able with the sophisticated criteria to measure effectiveness but not efficiency unless we use the input measures. With our computers it becomes operationally feasible to tie the input and output data systems together. It will require a great deal of thought and planning, between program people, administrators, and statisticians, but it can be done and it must be done if our mental health administrators are to know whether they are using their money wisely and effectively. We can say, yes, we are treating effectively 20 patients, but maybe these 20 patients are being treated at too high a cost. The treatment may be tremendously inefficient and we need to find out why.

What concerns me most in this is the need for a person in the program who thinks and functions in terms of serious applications of the data in the more advanced functions of evaluation, development, and research, as well as in surveillance and recordkeeping functions. Shall this person be the statistician who will be a significant leader in the program's administration, in planning and development, or will the statistician continue to be the bird in the cuckoo clock who fills out the federal report and answers occasional memos. Time will tell, but I believe it is time for us to stop merely counting our programs and find out instead whether our programs really count. Statisticians should move from being merely technicians to becoming leaders in the applications of their data systems to the agencies' programs and problems.

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THE NEW HAVEN CENSUS USE STUDY—A SMALL-AREA-DATA RESEARCH PROJECT

Caby C. Smith

Bureau of the Census

The first U.S. census was taken in 1790. Since then there have been 17 censuses, and except for the last one in 1960, they were all done in the same way—by personal visit to each household.

In 1960 the U.S. Post Office delivered the census questionnaires in advance of census day. Householders were asked to complete the questionnaires and to hold them until census interviewers visited to collect the information.

In 1970, for the first time, the Census Bureau will use a mail-out/mail-back data collection procedure in the 143 largest SMSA's and other urbanized portions in the country where over 60 percent of our population lives. The households in the remainder of the country will also receive their questionnaires by mail, but will be asked to complete it and hold it for the enumerator to pick up. There are three byproducts of the 1970 mail census which directly or indirectly benefit small-area-data users. These are:

1. Metropolitan Maps

The Census Bureau's Geography Division is preparing standard scale "Metro" maps for all of the SMSA's in the country.

2. Address Registers

Mailing addresses for the mail SMSA's will be acquired by the Census Bureau and these addresses will be updated by the U.S. Post Office just prior to mailing the 1970 Decennial Census questionnaires. Such address lists are called "Address Registers."

3. Address Coding Guides

Obtaining census information by mail instead of making personal visits has made it necessary for the Census Bureau to develop a method of relating data for an address to the correct census block and tract for tabulation purposes—an address coding guide. A cooperative arrangement between the Housing and Urban Development Department and the Census Bureau was developed to create these address coding guides. Local planners, with HUD financing, are using census worksheets with address ranges, census metro maps, and with local address source material are creating records which assign address ranges to census block-faces or block-sides.

Both the metro maps and the address coding guides will be made available to anyone in the mail census SMSA's. The address register is confidential and will not be released. It may be used, however, by the Census Bureau to meet certain special requests, such as address-to-address computer matching, or as a source of addresses for sample surveys.

The availability of these census byproducts combined with the growing need for small area data and improved accessibility to census data led to the creation of a Census Advisory Committee on Small-Area-Data. One of the first acts of this committee was to recommend establishing a census research study in a city where census pretest was conducted in April 1967 in the New Haven, Conn., SMSA. With financial support and use of the city's IBM–360 Model 30 from Mayor Lee of New Haven, and the Federal agencies represented on the advisory committee, the New Haven census use study office opened in September 1966. Current financing will allow the use study to continue into fiscal year 1970, and there are good indications that it may remain in New Haven to work with 1970 data. General financial participation and special project funds amount to well over a million dollars. General financial participation from Federal departments comes from:

—The Department of Transportation,
—The Department of Health, Education, and Welfare,
—The Department of Housing and Urban Develment,
—The Department of Commerce,

—The Department of Defense.

Agencies supporting special projects are:

—The Bureau of Public Roads,

—The Children's Bureau,

—The National Institute of Mental Health,

—The Office of Civil Defense.

We expect that other Federal departments will want to participate in the census use study in the near future.

The New Haven census use staff is composed of 15 professional, technical and clerical personnel, with four additional staff members whose salaries are paid by local and Federal agencies. Two Yale University students are working as programers and two consultants are assisting us: Mr. Edward Hearle of Booz, Allen and Hamilton; and Mr. John Sweeney of Cambridge Computer Associates. We truly have a Federal-State-local cooperative effort in New Haven.

Immediately after the use study office opened, the staff began meeting with Federal, State, city, university, and private groups to acquaint them with the nature of a census and the objectives of the use study. Over 200 meetings have been held in an attempt to get well-defined needs for census products and clear specifications for programing special tabulations from the basic data record tapes. Special projects or requests for tabulations were only accepted if they were significant in terms of the study's objectives and if the product would be generally applicable in cities across the Nation.

The objectives of the census use study are:

1. Determine both the *current uses* and likely future needs for census data in existing local, State, and Federal programs.
2. Develop a system that will allow efficient *merging* of census data with other local and State data to meet the needs of specifically defined programs with the confidentiality of census information fully protected.
3. Investigate the benefits of cooperative data collection between census and other local, State and Federal groups with special emphasis on personnel requirements, preparation of guides, and development of uniform terms and procedures.
4. Investigate the level of detail and form in which census data should be made available to local users. This will include investigating ways in which the Census Bureau's tabulation program for small area statistics can be improved and how special tabulations and summary data on magnetic tape can be made readily available, at low cost, to meet local needs.
5. Develop a package of computer and statistical programs for use by local committees to allow rapid conversion of 1970 Decennial Census data into forms more useful for local analysis.
6. Test and implement various applications of proposed census mapping and computer graphics techniques using local and census data.
7. Analyze the results of the study for potential strategies to be incorporated in the 1970 census plans, and in local community programs to take advantage of census and local data.

These objectives fall into four major avenues of research:

1. Tabulations,
2. Matching,
3. Mapping and computer graphics,
4. Feasibility surveys.

In addition there are special projects which may utilize some or all of these research categories.

Tabulations

Dozens of requests for tabulations of the New Haven census pretest "complete count" and sample data have been received during the past several months from city and State agencies and private groups. Requests received to date include: (1) different age and income breakdowns for the poverty programs and educational interests; (2) persons per room, by age and race, in occupied units, as a measure of overcrowding, and (3) special housing tabulations, by income and rent, for the elderly. As we receive requests for tabulations they are processed according to type, area unit, and whether it is feasible to produce the data from a programing and cost standpoint, that is, the "everything by everything" requests are not processed unless more meaningful specifications can be developed. Requests for tabulations are coordinated and combined when possible with those of other groups.

The census basic record computer tapes have been converted to IBM format at the Bureau for use on New Haven's IBM–360, Model 30, or IBM–7094's at Harvard or Yale Universities. These tapes will be used for producing special tabulations according to locally defined needs.

The data-text system, developed by the Department of Social Relations at Harvard, will be used to produce some of the tabulations from the Census Bureau's basic record tapes. Relatively inexperienced programers can be used with this system to quickly produce data from a variety of requests.

One of the primary problems of producing tabulations is to assure that information about the individual or household is not disclosed. The Census Bureau has established a Confidentiality Committee to study the various disclosure problems involved in releasing small area data.

Using the Bureau's address coding guide, individual addresses can be identified to block-faces and these block-faces can be used as "building blocks" to create local administrative study and project areas for which census data is needed for planning and evaluation purposes. Previously it was only feasible to produce detailed tabulations for standard census tracts or large political units. New Haven data users are submitting area dictionaries describing their own project or study areas for which detailed data are needed. Some of the area dictionaries are:

1. Traffic zones (approximately one-sixth tract size).
2. Community action program and redevelopment project areas.
3. School attendance areas.
4. Telephone cable or market areas.

Tabulations by small, locally defined areas will be valuable in evaluating current programs and in defining new project areas.

Matching Studies

One of the basic objectives of the use study is to develop the computer programs for effectively relating local data to census data through geographic coding of street addresses using the address coding guide and address register. The techniques, when developed, would also allow the merging of two local files of data. A two-stage matching program is now fully operational in New Haven. The first stage preprocesses the street address into a fixed format in preparation for the matching operation.

Several matching studies have been done and others are planned. They fall into three separate categories: area, address, and individual. The area match involves geographically coding to block face the addresses from local records using the address coring guide. Matching at the address level, e.g., vital records addresses to census data, require the use of the address register. Matching to the individual level, e.g., relating census data to individual hospital or clinic records, requires the basic characteristics of the indvduals from both records. These characteristics, sex, age, race, relationship, etc., are used for matching since the census basic tapes do not contain unique identification of the individual.

Some of the area and address matches done to date are:

—State birth records,
—Housing complaints,
—Geographic coding of residence of New Haven high school students,
—Police complaints,
—Annual school census records.

After the matching operation, the census data will always be aggregated to a level where census confidentiality rules are not violated.

Mapping and Computer Graphics

Another basic objective of the census use study is to experiment with new and different ways of displaying census and local data using computer graphic techniques. In order to do mapping experiments, a geographic base file had to be developed. Donald Cooke and William Maxfield of the census use study staff, with advice from the Bureau's Statistical Research Division, created the DIME (Dual Independent Map Encoding) file to serve this need.

To prepare a DIME file, census metro maps and local address sources are needed. All map features are divided into three groups (1) *lines,* e.g., streets, railroad tracks, city limits, streams; (2) *land areas,* identified by census tract-block numbers, and (3) *nodes,* e.g., points where lines intersect, the ends of deadend streets, or points of significant curvature of lines. The nodes are numbered and transcribed onto coding sheets along with street names, census tract and block numbers, and street address ranges between nodes. The information is then keypunched and in a separate operation coordinates are assigned to the node numbers with automatic equipment. The combined information is then transferred to magnetic tape where computer edits are run to detect errors, such as unbounded blocks, so that a predictable level of accuracy can be achieved. A reproduction of the map can then be made by computer-driven plotting equipment.

We are currently producing computer programs for assembling "tailored" statistics and maps for locally defined special areas. Computer mapping techniques using the pen plotter, printer (SYMAP and MAP 01), the geospace plotter, and cathode ray tube with census and local data are being tested.

The DIME system is now being used in New Haven and DIME files have recently been prepared for Roanoke, Va., and Binghamton, N.Y., to further test the procedures and programs so that the DIME system can be made into a do-it-yourself package for

planners who wish to do address matching, data display, and tabulations of local or census data.

The final system will be made available to planners across the Nation who need a comprehensive geographic base file.

Some examples of geographic coding applications are:

—Assigning school district numbers to census block data in order to assess school districting needs.

—Assigning grid coordinates to police complaint records so computer produced maps can be used to help deploy police.

—Assigning census tract and block numbers to health records to allow rapid tabulation and display of morbidity and mortality rates for small areas of a city to assist in predicting health facility needs.

Feasibility Surveys

Addresses of a subsample of the 25 percent sample household in the pretest census for the New Haven SMSA were selected for two mail-out/mail-back sample surveys: The New Haven area travel survey (an origin and destination-type survey) and the New Haven family health survey. The questionnaire wording, format, and data-collection procedures for these surveys have been made more compatible with Census Bureau procedures so that the sample survey data will be more compatible with census base data. The Bureau of Public Roads plans to arrange for such surveys in several SMSA's after 1970, using sample households determined by census and then relate the travel data to journey-to-work and other basic census characteristics.

The family health survey, which contains questions pertaining to the health of all family members, child day-care arrangements for working mothers, and family planning questions, is being conducted for the maternal and child health section of the State of Connecticut. The survey is sponsored by the Connecticut State Health Department through funds made available from the Children's Bureau. Maternal and child health officials hope to determine how such studies might, when combined with decennial census data, help them in directing their funds and efforts to assist families and communities by providing more and better child day-care and health centers.

The Children's Bureau is interested in repeating the family health survey, with some modifications, in 20 cities across the Nation in the fall following the 1970 Census to assist in determining sites for child-care facilities.

Cooperating Agencies

In addition to those previously mentioned, the following State and local agencies are providing assistance in the form of consultants, staff services, equipment and supplies, office space, computer and reproduction facilities, etc.:

City of New Haven,
City of West Haven and other city and town planning departments in the New Haven SMSA,
South Central Connecticut Regional Planning Program,
Community Council of Greater New Haven,
Community Progress, Inc., of New Haven,
New Haven Redevelopment Agency,
Yale University,
Harvard University,
University of Connecticut,
University of Southern Connecticut,
Connecticut State Government Agencies:
State Highway Department,
Department of Public Works,
State Health Department.

Considerable assistance has also been provided by local business and industry in the New Haven area, particularly the utility companies.

Special Projects and Activities

A few of the projects and peripheral activities associated with the New Haven census use study are:

1. Yale University under contract to NIMH conducted a sample survey in the "hill" project area of New Haven last summer and will provide us with addresses of their sample units for which they will request aggregated census tabulations. The base for the sample was Census Bureau updated housing unit block counts.

2. Arrangements are complete with NIMH for an individual matching techniques study. Psychiatric clinics in and around New Haven will record the necessary address identifiers and personal characteristics of incoming patients for a 6-month period ending this summer to facilitate a match to census data. Aggregated tabulations on families of the patients will then be provided by census.

3. The Law Enforcement Assistance Agency of the Justice Department has provided funds to the city

police department under a grant to explore the use of computers and census data for improved national law enforcement. The city police department has a copy of the census address coding guide and since last summer have been using it to geographically code police records. A matching study and special tabulations are also part of the police department's program under the grant. A major redeployment of police personnel took place in March as a result of special census data and other police department studies relating to complaint and arrest information.

4. The Harvard Laboratory of Computer Graphics is planning to attach a staff member to the use study office to use the census pretest data to produce maps showing housing and related characteristics under a grant from HUD.

5. The use study staff are cooperating with representatives of the Regional Scientific Center in New York on a project to display census data on their geospace plotter using the DINE system.

6. The National Center for Health Statistics plans to compare computer coding of death records to clerical coding using methods developed with New Haven vital records by the census use study.

7. Under funds made available from the Office of Civil Defense, the South Central Connecticut Regional Planning Agency is conducting a community shelters program. Special tabulations have been requested which will assist in daytime-nighttime population estimates for allocating the population to available fallout shelter space. The Office of Civil Defense has asked the use study to study the problem of allocating the population to shelter spaces by computer using the DIME system.

8. A project sponsored by the Children's Bureau and the Connecticut State Health Department will combine data from the State birth records with the obstetrics information from the Yale-New Haven Hospital and summary census data of the mother's residence at the time of the infant's birth. These data will be displayed using computer graphic techniques and target neighborhoods will be defined based on the distribution of the combined local and census data.

These are only a few of the projects being developed at the use study.

Dissemination of Study Results

Results of the use study will be considered when planning the 1970 censuses and other census programs, and hopefully by local communities in applying and relating the results of the census to their own data needs. Success of the study will depend, therefore, on a fairly extensive program of education, communications, and technical aid to the data users. For this reason both written and visual materials will be prepared which can be used to explain the study results and recommendations to interested groups in all parts of the country. Computer programs and complete "packages" will be developed for use by local planners on local computers.

Brochures, reports, monographs will be released periodically beginning this summer.

Summary Tape Workshops

The Census Bureau's newly created Data Access and Use Laboratory, under the direction of Mr. John Beresford, is establishing contact with people across the country who would like to act as Census Summary Tape User Workshop sponsors after the 1970 census. These sponsors would set up workshops to show people how to use 1970 census summary data on tape. Systems Development Corp. is planning to work with the Bureau in assessing the technical problems in the areas of tape compatibility between census and noncensus hardware systems, software packages for tape use, urban problems, census tabulation uses, urban information systems, etc. If anyone is interested in working with census summary tapes they should contact Mr. Beresford in care of the Census Bureau in Washington.

Plans are now being formed to have the workshop sponsors come to New Haven beginning next summer for census summary tape seminars which would take advantage of the New Haven experience and would last for several weeks.

With the experience of the New Haven census use study and the national network of Census Summary Tape Workshop sponsors coordinated by the Data Access and Use Laboratory and Systems Development Corp., plus numerous other advances in the areas of data collection, processing and publication, made by various divisions of the Bureau we will be much better prepared to serve data users at all levels after the 1970 census.

REPORT ON CURRENT EFFORTS TO MATCH PATIENT INFORMATION TO U.S. CENSUS RECORDS

Richard W. Redick, Ph. D.

National Institute of Mental Health

The Biometry Branch is presently engaged in carrying out a census matching study in the New Haven metropolitan area in connection with the U.S. Census pretest conducted there in April 1967.

This is an area of research which involves the utilization of census records as a source of data for studies designed to measure the rate of occurrence of a particular event—in the present case, the rate of admission to psychiatric facilities—among specific population groups defined by various demographic and socioeconomic characteristics.

The procedure involves, first of all, identifying individuals to whom the event has occurred, in our case patients admitted to psychiatric facilities. Secondly, locating for these individuals their census schedule which contains data about the individual and the household where he resides. Third, abstracting from this schedule detailed data on the characteristics of the individual, tabulating the data, and finally relating this numerator or patient data to base population data, prepared by the Census Bureau, in order to obtain admission rates.

If the census records for all persons included in the study are found, it may be assumed, first of all, that each individual counted in the numerator has been enumerated in the population, and secondly that each individual is classified identically in both the numerator and the population denominator with respect to the characteristics under study. It should be pointed out, however, that these assumptions usually do not hold if the numerator data are obtained from sources other than census records, such as hospital records, vital statistics records or patient interviews.

As we learned from a similar study carried out in 1960 involving the use of census records, there are problems connected with the use of this census approach which hamper the analysis of the data. These problems must be minimized if this approach is to be used in any future studies that may be conducted in connection with the 1970 census.

In this context then, I want to briefly describe to you some of the problems that we encountered in the 1960 study, and indicate how the study that we are presently conducting in New Haven is attempting to deal with some of these problems. In conclusion I will indicate the criteria that we feel are needed to determine the feasibility of carrying out similar studies in 1970.

The 1960 census matching study was carried out in two States, Maryland and Louisiana, and included all patients admitted to psychiatric facilities in those two States during the 1-year period subsequent to the 1960 census.

A major problem that we encountered in analyzing admission rates for this study was the fact that we were only able to locate census records for 65 percent of the patients. This was a considerably lower match rate than we expected since two other census matching studies which were conducted concurrently at that time, one involving mortality statistics and one on juvenile delinquents, had match rates ranging between 75 and 80 percent.

The failure in our study to locate census records for almost one-third of the patients was attributed to three major causes: (1) inaccuracies in the patient data that were obtained from the psychiatric facility, such as inaccuracies in the patient's name or in the address information given to us; (2) clerical errors in the matching operation which was carried out by Census Bureau personnel; and (3) under-enumeration of population by the Census Bureau.

Unfortunately, sufficient data were not available to indicate the relative influence of these three factors, and this raised a serious question for us concerning the validity of admission rates based on the matched cases only.

When the numerator data were augmented by the nonmatched cases whose characteristics, were determined from interviews with a 10 percent random sample of the patients included in the 1960 study, a

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second problem arose in that the interpretation of differences in rates was complicated by the fact that the completeness of the denominator data was in question owing to census under-enumeration.

Unfortunately no provision was made in the 1960 study to carry out any sort of systematic or intensive investigation of reasons for failure to match, and the Census Bureau up to that time had made little progress in evaluating the 1960 census results with respect to underenumeration, although they had produced some net census undercount by age, sex, and color.

Consequently, our efforts in the 1960 study indicated some of the problems connected with using the census record approach, but did not provide us with any solutions to these problems.

This brings us then to the study that we are currently conducting in the New Haven area.

The availability of census-type data from the April, 1967 census pretest in New Haven, provided us with an opportunity to design a methodological study which would have several purposes: namely, (1) to investigate ways of insuring a higher match rate than we obtained in the 1960 study; (2) to examine the nonmatch cases in considerably more detail to pinpoint reasons for failure to match; and (3) to attempt to determine the extent of under-enumeration among various subgroups of the New Haven population, and how such information might be used to develop adjustment factors for analyzing data in studies of this type.

The New Haven study, like the Maryland and Louisiana study, involves patients admitted to the psychiatric facilities which serve the New Haven metropolitan area. Identifying information is being collected on all admissions over a 6-month period subsequent to the April 1967 pretest.

In addition to the sample of about 1,500 patients, similar information on 1,000 persons from the general population will be available from a survey that was conducted in the Hill area of New Haven and in the suburb of West Haven.

This will provide us with the opportunity to examine match rates for patient and nonpatient population which in turn may provide us with some additional clues about the feasibility of using this census record approach.

In order to attempt to achieve a higher match rate in the New Haven study, i.e., a higher match rate than was obtained in 1960; some revisions in the procedures used in 1960 have been instituted in the present study, and also some new procedures are being introduced. Included among the revisions are some changes in the content of the patient identifying information being collected from the psychiatric facilities such as obtaining more detail about the names of the patient e.g., the maiden name for female patients, and any aliases or nicknames by which the patient may be known, and attempting to get more detailed information about the composition of the household where the patient resided at the time this census was taken.

In connection with the first phase of the matching operation which will be a clerical or hand operation similar to that carried out by the Census Bureau in 1960, the criteria used to specify the conditions for determining whether a case is matched or nonmatched have been expanded. Thus, more leeway is being given in matching with respect to the address information and certain characteristics of the patient, such as age.

Subsequent to the clerical match operation we will be experimenting with computer matching. This will involve using only the address of the patient as well as his age, sex, and color, and certain characteristics of members of the patient's household. The computer match will eliminate the need to use the name of the patient.

Subsequent to completion of the two matching operations, both of which will cover all persons included in the study, a comparison will be made of the results of the two procedures not only to determine which method produced the greater proportion of matched cases but also to examine the number of cases which did not fall in the same category of being matched or nonmatched in the two procedures. These latter discrepancies will be further investigated to see if they throw any light on reasons for failure to match. This may partcularly point up the problem of clerical errors that occur in a hand match operation.

Along similar lines a detailed investigation will be made of all nonmatched cases to determine the reasons for failure to match and whether or not for certain categories of nonmatches a further search by either method, that is, clerical or computer matching, could produce additional matches.

In the 1960 study, it was found that the nonmatched cases fell roughly into three major categories. First, those where the address was not found at all. This could have been due to the fact that either the patient reported a completely erroneous or nonexistent address on our patient information form or that the Census Bureau had not enumerated the address at the time of the census. The second category included those cases where the address was found but the household was not found. This may have resulted either because the information received from the psychiatric facility

on the patient and the members of his household was completely erroneous, or the fact that the census listed the address but failed to enumerate the household at that address. In the third category were those cases where the household was found but the patient was not listed as a member of the household. This could occur where the patient had reported information that he was a member of a particular household, but was actually in an institution or living elsewhere at the time the census was taken, or where due to census under-enumeration the patient may have been a lodger or a roomer in a household but was not enumerated as a member of that household by the household head.

The present study will investigate these two latter categories of nonmatches, i.e., "address found, household not found" and "household found, person not found," and introduce additional procedures for determining whether or not a household and/or the patient can be located elsewhere in the census records. Where these procedures are successful in locating the patient, the cases will be reclassified as matches. Documentation will be made of the number of these nonmatched cases which are so reclassified, the amount of time and effort required to locate these additional matches, and the reasons for failure to match these cases initially.

For all other cases which remain in the nonmatched category, an attempt will be made to determine whether the failure to match was due to errors in the identifying information obtained on the patient, or to under-enumeration by the Census. The lack of this information in the 1960 study posed problems in connection with assessing the validity of admission rates based on matched cases only.

Relative to another problem encountered in the 1960 study, namely, the effect of census under-enumeration upon the completeness of the denominator data used to compute rates, we are hopeful that the Census Bureau will conduct a detailed investigation of the extent of under-enumeration among various subgroups of the population in the New Haven census pretest. This would then give us some idea of what problems may be encountered with respect to under-enumeration in the 1970 census.

For purposes of assessing whether future studies of this type are feasible, we have set down some of the criteria which we feel are needed to determine this feasibility. First among these criteria is the kind of match rate that can be obtained in a study of this type. We are hopeful that the New Haven study will produce a higher match rate than that obtained in the earlier 1960 study. A second criteria involves the extent to which the Census Bureau will examine the whole area of under-enumeration in the 1970 census, i.e., will they conduct more extensive examination than that which they carried out in connection with the 1960 census, and will it be done fairly quickly subsequent to completion of the 1970 census?

A third criteria concerns the extent to which a distinction can be made between errors in patient information and census under-enumeration as causes for failure to match, and then utilizing this distinction, relate it to characteristics of the nonmatched cases for purposes of developing methods to adjust for nonmatches when examining differences in rates between the various population groups under observation.

A fourth and final criteria, which may prove to be the most important determinant of all, involves the cost of carrying out studies of this type and the availability of funds to meet these costs.

CONTENT AND BEHAVIOR: A SOCIAL AREA STUDY OF NEW YORK CITY [1]

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Whether seeking to explain or treat identified pathology, researchers and practitioners in the mainstreams of medicine, psychiatry and psychoanalysis have traditionally regarded the individual as their focal unit of study. Following the medical model, illness was conceptualized as a foreign agent that existed within the patient, under his skin. Isolated individuals opposed this view, but in general the relationship between the individual and his environment was largely ignored.

Within the past several years, an increasing number of writers interested in behavior and behavior disorders have sought to modify the basic assumptions implicated in the clinical or medical model of illness. They come from such diverse backgrounds as psycho-analysis, general systems theory, contract psychology, social biology, and ecology. These men subscribe either explicitly or by implication to the position that psychopathology is not "subdermal" but develops in a context larger than the individual. Instead of focusing on factors within the individual that lead to psychiatric difficulty, the subject of study becomes the transactions between the individual and his environment.

In the earlier stages of the community mental health movement, attention was largely devoted to other individuals in the patient's environment, but there has been increasing attention directed at prevailing environmental conditions and characteristics. In line with this trend, mental health workers have become interested in the sociological studies of urban typology and particularly in the method of social area analysis in relation to disordered behavior in large metropolitan areas.

Recognition that the social context might have equal or greater relevance than individual characteristics in predicting behavior has led to a change of treatment strategy as well as focus. Today many community action programs adopt an "advocate role," fighting for the individual in order to change his social context, and replacing the traditional psychotherapeutic goal of only changing the individual. In health and mental health services, the clinical or medical model introduced to 19th-century medicine is being increasingly replaced by the public health model. The latter conceives of illness not as a collection of independent and discrete entities like measles and diptheria, but as interchangeable and shifting manifestations of disorder best dealt with in the context of social and environmental factors.

Despite these widespread changes in theory and action characterizing mental health and other community programs across the Nation, little study has been devoted to the comparative merits of the various methods of intervention. While the massive influx of Federal aid provided under the Community Mental Health Centers Act of 1963 assures widespread acceptance of the public health model in psychiatry, little is known about the techniques that will most effectively fulfill current goals.

Many mental health organizations throughout the country will soon be responsible, for the first time in their history, for the mental health or social competence of entire catchment area populations rather than just those who actively and spontaneously seek treatment. These changes of emphasis and structure have profound implications for the planning and implementation of community mental health programs, and also create an urgent need for their systematic evaluation. Using methods derived from social area analysis, we have become involved in the problems of evaluation and planning of such programs, as well as the analysis of underlying assumptions regarding the effect of environment on its inhabitants.

Specifically, one aim of the present study was to develop a method of accurately describing the social characteristics of demarcated urban areas in terms meaningful to the planners of community health programs. A second aim was to evaluate the effect of en-

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vironments on the social behavior of their inhabitants, and a third was to develop procedures for analyzing the above information to determine the most effective means of intervention and to compare the efficacy of alternative approaches along these lines.

Ideally, an integrated and comprehensive information system describing the catchment area population and its environment should be available as one basis for planning a network of mental health services. This would include a series of population, environmental and behavioral variables and their interrelationships to facilitate the design and implementation of community programs. After this preliminary phase of establishing an information system, a research project should be inaugurated to evaluate the effectiveness of existing programs. This would entail measurement of change of variables presumably influenced by mental health programs with other influences held constant. The present paper describes the first step in this plan: the establishment of an information system.

The set of procedures we designed to meet these research aims is largely derived from work in urban sociology, and more specifically, social area analysis. Urban sociology is a 20th-century specialization developed by Park and Burgess at the University of Chicago, concerned with the spatial distribution of social problems and the formulation of urban typologies. Mapping techniques were used to reveal such spatial distributions, relying largely on census data for basic information. The early theories of urban typology included Burgess' concentric zones hypothesis, Hoyt's sector hypothesis, and Harris' multinucleation hypothesis. Although these typologies generated considerable research, flaws in underlying assumptions precluded their validation, and interest in this approach declined. More recently, the studies of Shevky, Tryon, and others in the analysis of social areas have provided a theoretical basis and specific methods for delineating the social characteristics of areas. These investigators have been less interested in spatial distributions, and define social structure solely in terms of the relationships among characteristics.

Shevky and his colleagues used 1940 census data for Los Angeles to develop three indexes—social rank, urbanization, and segregation—in terms of which census tracts could be scored. Tracts with similar patterns of scores are regarded as representing a particular type of social area. Tryon, working from 1940 census data for San Francisco, derived three indexes by cluster analysis of census items, which he labelled socioeconomic achievement, family life, and assimilation. These are roughly equivalent to the indexes that Shevky worked out on theoretical grounds. Borgatta and Hadden did a factor analysis of 32 census tract items and obtained three stable factors that applied to different regions of the United States: socioeconomic status, suburb factor, and disorganization-deprivation. The first two are clearly comparable to the indexes of Shevky and Tryon, and since the item with the highest loading on disorganization-deprivation is the percent of Negroes, this factor is also comparable to Shevky's segregation and Tryon's assimilation index.

Social area analysis has been adopted by psychologists as a method for studying the relation between environmental and behavioral variables. Until now, it has most often been used in the study of juvenile delinquency. In the current study, we decided to adopt its general framework to study the relations between environment and variety of social, psychiatric, and physical problems. The method lends itself to the classification and manipulation of information describing any given population and its environment. It is assumed that any large geographical area can be divided into two or more subareas to be observed and described just as people or objects may be observed and described. These geographical subareas or units ideally have the following characteristics:

1. Homogeneity in terms of the variables observed so that their measurement will accurately describe the area. For example, a unit may be delineated so that it includes very poor and very rich people. If one is interested in financial status, the statistic of median income in such an area does not accurately describe the population contained in it.
2. Stable boundaries to permit the measurement of change over time on a given set of measures. Since census data is often used, there are characteristically 10-year intervals between measurements.
3. A sufficiently large population in each unit of observation to yield reliable observations.

There must also be enough units of observation to insure stable or replicable results and relationships. The reliability and validity of the measures chosen for study should be relatively invariant across the units. Since the variables they are intended to describe may have different statistical distributions, both simple and complex relationships among these measures must be considered.

In the course of reviewing possible sources of data for New York City, it became apparent that public and private agencies use many different units of observation, often based on heterogeneous areas, making comparative and correlational studies difficult if not im-

possible. To mitigate the effect of such problems, we chose the health area, as defined by the New York City Department of Health, as our unit of observation. Since each health area is composed of two or three census tracts, we were able to describe each health area in terms of the indices available in census data, as well as epidemiological data compiled by New York City agencies that are based on health areas.

We chose 25 variables describing social and behavioral characteristics, most of which were measured at two points in time. This study reports on only 19 of them, each representing a single occasion. In order to have our data in comparable form, we used frequency of occurrence, with two exceptions, to quantify our variables; this was calculated separately for each of the health areas. We classified these 19 variables into two groups. The first, derived from census data, was regarded as descriptive of the environment, and included such variables as unemployment, overcrowding and the number of residents who lived abroad in 1955. The latter variable was highly correlated with number of Puerto Ricans in the population while also including a migration component. The other group of variables describes the behavior health and mental health of populations, including number of premature births and number of psychiatric hospitalizations. The latter group of measures was conceived as outcome variables presumably linked to environmental conditions.

Thus, we selected 19 variables to work with intensively; of these, nine were regarded as predictor variables describing environmental conditions. The other 10 were regarded as outcome variables describing behavior, health, and mental health, presumably representing certain crucial outcomes of living determined to some extent by environmental conditions.

Environmental (predictor) variables

From 1960 census data unless otherwise noted:

1. Number of unemployed people 14 years or older.
2. Number of overcrowded housing units.
3. Number of people living in the South in 1955 (mostly Negro).
4. Number of people living abroad in 1955 (mostly Puerto Rican).
5. Median family income.
6. Number of people 14 years or older who are divorced or separated.
7. Median years of education completed by people 25 years or older.
8. Number of people on welfare funds (1962).
9. Number of people in the health area.

Behavioral (outcome) variables

From 1960 data unless otherwise noted:

1. Number of admissions to State and city mental hospitals (1961).
2. Number of out-of-wedlock births (1962).
3. Number of infant deaths under 1 year.
4. Number of births under 2,501 grams (premature).
5. Number of births with prenatal care beginning in ninth month.
6. Number of births with prenatal care beginning in seventh or eighth month.
7. Number of cases of reported venereal disease.
8. Number of reported homicides.
9. Number of reported suicides.
10. Number of reported arrests in the age group 7–20.

Our method of evaluation was to study the data for each health area in a borough of New York City, with the intention of studying all five boroughs separately and ultimately combining data across boroughs. Although our "N" is the number of health areas per borough, the data is based on all of its residents. In this sense we are not using samples from a larger population, and cannot replicate our work. However, comparison of data from the different boroughs and at different points in time can provide some estimate of the generality and stability of our results.

At present, we have completed preliminary analyses for two boroughs, the Bronx and Brooklyn. The Bronx contains 63 health areas with an average population of twenty-two and a half thousand and a standard deviation of about 7,000. Brooklyn contains 113 health areas more or less equal in size and distribution to those of the Bronx.

In order to assess the relationship among the nine predictor variables describing health area environments and the 10 outcome variables listed above, a 19 by 19 product moment correlation matrix was computed for each borough. To estimate the degree to which differences among the health areas could be explained by a comprehensive description of environmental conditions, multiple correlation coefficients between the nine predictor variables and each of the outcome variables were computed. Throughout, the effect of population size of the health area was held constant by subtracting from the square of the multiple correlation coefficient the square of the product moment coefficient between the population size variable and the outcome variable. The square root of the resulting value is the health area, size-corrected multiple correlation coefficient, indicating the degree of rela-

tionship between a weighted linear combination of the nine predictor variables and the outcome variable.

Table 1 presents, for each borough, the multiple correlation coefficient between the nine predictor variables and each outcome variable, and this coefficient corrected for population size. It can be seen that the degree of relationship between the combined predictor variables and the outcome variable is consistently high for both boroughs, except for the measure of suicides. In both Bronx and Brooklyn data, six of the 10 corrected multiple correlations exceed .90, indicating a strong relationship between environmental conditions and behavior and health. Thus, in predicting such factors as premature births, infrequency of use of medical facilities, venereal disease, out-of-wedlock births, and reported arrests, more than three-quarters of the variance is accounted for by environmental parameters. High if less spectacular correlations were also found between number of homicides, infant deaths, hospitalizations for mental illness, and environmental variables.

TABLE 1.—*The prediction of the 10 outcome variables corrected for health area population size*

Outcome variable	R*		Corrected R	
	Bronx N–63	Brooklyn N–113	Bronx N–63	Brooklyn N–113
Hospitalization for mental illness	91	92	77	86
Out-of-wedlock births	97	97	97	97
Infant deaths	81	93	80	90
Premature births	93	91	90	84
Prenatal care (9th month only)	95	96	95	94
Prenatal care (7th-8th month)	97	97	97	96
Reported V.D.	97	96	97	95
Reported homicides	68	82	68	82
Reported suicides	48	66	35	55
Reported arrests	94	92	94	92

*Decimals omitted; all values in .XX format.

Relationships among the nine predictor variables are moderately high. For the Bronx they have a mean correlation of .53, and for Brooklyn, .49. This suggests that the number of variables in our predictor battery could be reduced without substantially reducing its power. This will be studied systematically by comparing the efficiency of different combinations of predictor variables in predicting different outcome variables in the five boroughs of New York City. Based on data we have at this point it appears that the role of a predictor variable varies considerably as a function of the particular outcome variable it is to predict and of the borough in which it was observed.

Description of a given health area in terms of the 19 environmental and outcome variables has considerable meaning to the health and mental health planner. The number of admissions to mental hospitals provides one estimate of the manpower needed to contend with such related problems as helping former mental patients adjust to community living. The number of pregnancies receiving medical care only in the third trimester reflects the nature of attitudes toward the use of health facilities and almost certainly the quality and style of service available to these people. The extent of migration from southern rural areas where medical and social services were seldom available offers one basis for planning educational programs.

Such variables also describe the type of stimuli which constantly impinge upon the people of an area. As Tryon points out, even if an individual is different from the majority of people living in his neighborhood and is therefore inadequately described by overall statistics and demographic data, we still have specific knowledge of the social situation in which he lives. As we have found, description of environmental variables reveals the level of social competence, nature of the opportunity structure, extent of antisocial behavior, and family stability characterizing a given area. Certainly all of these factors play a role in a resident's level of aspiration, self-esteem and pattern of behavior.

The question of the generality of our results is of great interest to us. In view of the variety of possible factors influencing the observed relationships between predictor and outcome variables, the similarity of the obtained multiple correlation coefficients for the two boroughs is striking. Seven of the 10 uncorrected R's varied no more than two points between boroughs. However, we cannot be sure that the same findings will emerge elsewhere, although we accept them for Queens and possibly Manhattan, possibly with some shift in the relative weights of predictor variables. But, of course, this is an empirical matter which we hope to resolve through continued study.

Assuming our results are in fact general, it is worth thinking about their implications for planning a community health program. Is it possible to improve the mental health of people living in miserable physical and social settings without also improving those environmental conditions to which behavior appears to be so powerfully linked? The answer to this question is

probably an emphatic "NO" and we suspect that a number of community mental health directors are keenly and anxiously aware of the odds against them unless the more fundamental social and economic problems of their catchment areas are also considered. By creating, for example, the Model Cities program, the Federal Government is indicating the need for comprehensive services focused on both environmental conditions and their consequences in order to eliminate slums.

Whatever may be the best strategy for improving the functioning of communities, our main interest is in the development of a set of procedures for evaluating alternate models of intervention. The 20 multiple correlation coefficients presented here hardly do justice to the richness of the data at our disposal. There are three additional kinds of analyses we plan to undertake. The first concerns the classification of health areas into types in terms of their similarity on both predictor and outcome variables, following the procedures of Tryon or other profile analytic methods. With similar health areas thus identified, changes under the influence of different conditions or programs could then be compared at regular intervals over a period of time. As mental health programs become activated in our great cities, changes in similar social areas with different programs could be compared on a variety of relevant predictor and outcome variables. Deviant social areas of a city—those changing abruptly in one way or another—could be identified and studied to determine those factors contributing to rapid deterioration or growth.

A second form of data analysis we intend to pursue concerns interborough comparisons in order to determine differential effectiveness of predictor variables and the social significance thus entailed. For example, the variable showing number of southern Negroes who came to New York City within the last 5 years is a far more powerful predictor of social and health problems in the Brooklyn data than it is in the Bronx. In contrast, recent migration from Puerto Rico is much more strongly related to maladaptive behavior in the Bronx, suggesting that the Puerto Rican is at a greater disadvantage here than in Brooklyn. Quite obviously, more detailed study of the interrelations between minority group membership and other predictor variables is needed before reasonably valid interpretations are drawn, but these preliminary observations suggest the value of this kind of analysis.

The third approach to data analysis that we are planning concerns the relationship between our predictor variables and a more comprehensive sample of behavioral measures presumably associated with social conditions. The range of measures could be as broad as the programs they were to evaluate. For example, by describing the social areas of a city in terms of the reading levels or academic growth scores of seventh grade students living in each social area, relationships between school performance and the neighborhood environment could be estimated. By acquiring information from established agencies and by gathering additional data through independent studies, each social area within a city could be comprehensively described.

The kind of data needed for the accurate and efficient description of urban areas is, unfortunately, often difficult to obtain. It seems to us, however, that the amount of money currently spent by most cities in gathering information by a variety of agencies using different and incompatible units of observation is probably adequate to sponsor a single data-gathering agency. Its task would be the coordination of relevant information for effective program planning and evaluation. Such an agency has been established for the entire state of Maryland so that it would seem equally feasible for urban use.

While the foregoing procedures may seem needlessly complex, we submit that such an approach is necessary to develop an empirically based urban sociology and to successfully evaluate the proliferating attempts at influencing the health and mental health of communities.

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MEASUREMENT OF THE IMPACT OF MENTAL HEALTH PROGRAMS

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I am pleased to be part of the National Conference on Mental Health Statistics this year, and I hope to learn more about the topics listed on the program—such as methods for measuring need, forecasting utilization of mental health resources and measuring change in patients. These topics are of vital concern to a program administrator.

I was asked to speak to you today presenting the point of view of a State mental health program administrator on evaluation of a mental health program. I wish I knew more about the subject I am to speak on—the measurement of the impact of mental health programs. I like that word "impact." There are many aspects of our program that can be measured but measuring the impact is the payoff. What does the program accomplish? What difference does it make that the program exists at all?

With your indulgence, I would like to review my own career in psychiatry in explaining the development of my interest in program evaluation. I began my residency training in psychiatry in the traditional manner, at a State hospital, actually the Hawaii State Hospital. I was assigned a roster of patients who had been the responsibility of the doctor who preceded me, and I started getting every fourth new patient coming into the hospital. I began accumulating clinical experience in a hurry, especially with the group in largest supply, the chronic schizophrenics. However, manic patients are rare and I didn't know much about them. My first manic patient was a charming, energetic little old lady—a retired schoolteacher. She was talkative and persuasive and she convinced me that she needed a day pass to get some things from home and settle some business. In those days the doctor was the sole authority in such matters; the day of staff teamwork and patient government had not arrived to add other dimensions to the evaluation of a patient's behavior and of his readiness for graded levels of freedom and responsibility. So I let my patient go out in her own custody. Ten hours later she was brought back by the police—singing and shouting and wrapped in a blanket. She had visited a series of friends and then moved from bar to bar in Waikiki. From there she started singing and dancing and disrobed in the street. I was astounded that a little old schoolteacher would do such things! I learned the value of objective measurements of patient behavior.

Later I learned the intricacies of conducting individual psychotherapy—how to understand the patient's communication, how to watch the patient's movements and expressions, how to listen to what he said, how to listen with the "third ear" to what he didn't say or what he really meant to say. With all this concentration on technique of understanding and influencing, it is easy to forget about what the goals of treatment are. The patient and the therapist get in the habit of meeting each week and interacting in a certain way. But what are they trying to accomplish and how will they know when they have accomplished it? It is good discipline for the therapist to ask himself those two questions and to write down the answers in his first note on the patient's chart—for frequent reference. What is the goal of treatment, and how will we know when it is reached?

After my period of training I became chief of a mental health clinic with outpatient and consultation services. Then I not only had to evaluate my own work with patients but also to make decisions for the clinic. These decisions involve evaluation. What patients are suitable for mental health services? For outpatient care instead of inpatient care? Which patients could be as well-served by family service agencies, school giudance counselors, clergymen, or family doctors—so that the time of the mental health clinic staff can be conserved and given as consultation instead of direct care to patients? Which patients are going to drop out after the first clinic contact or are not going to keep even the first appointment? Such patients are a drain on clinic time and cause a lot of paper work with nothing accomplished. Should such unlikely patients be

screened out before first contact or should the clinic adapt to their resistance to treatment or to their problems in getting to the clinic and send a staff person out to talk to the patient where he is?

These questions and the decisions based on answers to these questions are considered to be in the area of clinical judgment and are of importance to the clinician. A clinician seldom has the opportunity to get followup information on his patients after his contact with them ends. Studies of the status of clinic patients 1 year and 5 years after termination of clinic contact would add important information for the refining of clinical judgment. Such studies are important also in measuring the impact of a mental health clinic in its direct work with patients.

Usually the professional staff do not have time to track down former patients and evaluate them. However, a simple study can be done by graduate students or other people, under professional direction. They can find out if the patient had further psychiatric symptoms or problems after the clinic service, how he is functioning on the job and in his family, and so forth.

When the clinic becomes oriented to serving all the people in a designated catchment area, the staff have to look at the characteristics of the people who use their services and draw conclusions as to the people who don't. They may find that the people in certain neighborhoods use the service minimally. Is that because they don't know about the service or can't get to the clinic readily, because they are of high income and use private practitioners, or because they are afraid of the negative attitudes of their friends and relatives if they go to a place for crazy people?

Perhaps the clinic never gets cases under age 5 or over age 65. Why is that? Drug abuse by high school and intermediate school children is a major concern of the community, and yet the clinic sees few of these cases. Why? These are intriguing questions for the administrator who takes seriously his mandate to serve the whole population in his area.

How can these questions be answered? The staff can meet with the agencies they look to as referral sources or send out questionnaires to them. They can try to find out whether their services are well known and what the users think of their services. This will give some clues as to why certain age groups, ethnic groups, or economic groups seldom use the clinic and why other groups may tend to overuse the clinic. Potential users of the service can be asked what they know about it, what they think of it, and why they do or do not use it. Such groups of potential users might be residents of public housing projects, parent-teacher associations, and unions.

When the service demands far exceed the clinic's manpower, the administrator is forced to evaluate what he is doing and to decide how best to use his limited staff hours.

Most likely he will decide to curtail direct treatment of patients and to expand indirect treatment. He will encourage other helping people in the community, such as physicians and clergymen, to work with psychiatric patients and give them training and consultation. Theoretically he will thus spread the influence of the mental health professionals and bring help to more people. But evaluation is needed to determine whether the people in need are receiving appropriate help and are improving in some measurable way. And again, followup studies are an important and usually absent aspect of determining the impact of a mental health program.

The State hospital administrator has problems like those of the mental health clinic director but is usually less able to control the input of patients into his program. His concern is doing the best possible job with patients sent to his hospital and getting them out again within a reasonable period of time. Hopefully, he has some staff assigned to research and program evaluation who continually study the effectiveness of programs within the hospital. He has a measurement of effectiveness in the return rate of those sent out. Were they sent out too soon? Did they actually receive the aftercare that was arranged for them? What went wrong with those who returned? What went right with those who did not return?

When I was administrator of Hawaii State Hospital I had two sets of figures I watched closely—the daily patient census, and the number of staff vacancies. And frequently I looked at the budget figures—the shortage of money for purchase of medications, for activities for patients, for building maintenance, for furniture. The State hospital administrator usually has no time to look for what the hospital is not doing, that the community needs to have done, or to look at the long-range effects of the hospital's program. This kind of evaluation is best done by people outside the hospital staff.

The administrator of a statewide mental health program, such as the one I am in charge of in Hawaii, has the opportunity to see how the pieces of the total program fit together and has some power to bring them into a proper fit. With a data system including all parts of the program, such as we have in the Hawaii Mental Health Register, it is possible to identify

problem groups, which can then be studied in other ways. One problem group are the patients who go in and out of the State hospital several or more times. We need to learn more about this group of "revolving door" patients and to plan better for them. It may be that a regularly scheduled balance of time between home and hospital is best for a small subgroup of these "revolving door" types. Some families may be able to take care of a chronically ill relative at home most of the year but need to take their vacation away from the sick person and put him in the hospital one month each year. Conversely, a man may be able to take his chronically ill wife home for weekends, and during his vacation, but needs to have her cared for in the hospital during his work week. The larger group of "revolving door" patients could probably be stabilized at home, or in a family care home if appropriate care were given in an outpatient or day hospital service, with the capacity to give extra help during times of crisis.

Participation in mental health planning, in comprehensive health planning, in vocational rehabilitation planning and in planning for people in poverty areas has changed our view of what our purposes and objectives are in a mental health program. This change has added more confusion than clarity. It has erased some of the boundary lines around the mental health program and shaded in some peripheral areas of overlapping responsibilities.

For example, we have in Hawaii a newly expanded and coordinated system of dealing with alcoholics. We inspired ourselves to take more responsibility for alcoholism by following the court cases being appealed in various parts of the country concerning public drunkenness offenders. We pioneered in Hawaii by repealing our public drunkenness statue and adding intoxicated persons to the provisions of our new mental health law. Without any additional funds at the outset, we had to take responsibility for the cases formerly charged by the police for being drunk in a public place. We brought together staff from the private general hospitals willing to receive these cases in their emergency rooms, the State hospital, the mental health centers, the social services staff who administer the medical care program for indigents, the vocational rehabilitation workers, operators of private rehabilitation facilities for alcoholics, care home operators, police officials, and others, to work out a coordinated program under the leadership of the Department of Health.

We had difficulty in giving the State Legislature a description of this program and its budgetary needs. Each of the State agencies involved had its piece of the alcoholism program as part of its budget request. There was no established way of indicating the total scope and coordination of an interagency program.

The same type of joint planning and coordination is needed in other areas where the mental health program overlaps other programs.

Most of the preventive programs in mental health are the responsibility of other agencies. For example, family planning, prenatal care and well-child care are important in preventing the problems that children experience when they are brought up by parents who cannot adequately love, protect, train, and nurture them. These children are counted among the slow learners and the behavior problems and later among the drop-outs and delinquents. This is an example of a maternal and child health program that has consequences for educational and law enforcement programs. None of this is in the core of the mental health program; it is not the direct responsibility of the mental health program administrator. But surely it is part of mental health.

In the new mental health law in Hawaii, which we in the State mental health program had a large share in writing, we gave ourselves the authority to evaluate all mental health program activities in the State—public and private. So far we have not done anything about evaluating programs that we do not operate or help to finance. The Mental Health Association comes forward periodically with a stated desire to evaluate mental health programs, but they are not equipped to do this without our help.

The most crucial review of our State mental health program is done annually through the budgeting process. We are scrutinized by the executive branch and then by the legislative branch of State government every year. For about 8 years the executive branch in Hawaii has been asking the departments of State government to do long-range planning—to set forth objectives, to relate programs to objectives, to evaluate success in reaching the stated objectives and to indicate alternative programs that might be used to reach the stated objectives. An information system is needed to produce annually the data required to show whether objectives have been reached.

In the past year a program-planning-budgeting system has been started in Hawaii making the same requests and adding requirements for cost projections and cost-benefit analysis of the various alternatives. The PPBS material is an aid to the program administrator, to the budget department and to the Governor in carrying out the functions of the State government

in an effective manner. It is also an aid to the legislature in evaluating the executive branch and in making decisions about legislation and appropriations. It can and should lead to elimination of unproductive or harmful programs, to improvement of inadequate programs and to trial of new programs.

I have left to the last the crucial question of how to set the objectives of a statewide mental health program. In Hawaii we have an unusual situation in that all tax-supported mental health activities are operated at the State level. We operate nine regional mental health centers, the State hospital, and several specialized programs. The administrators of these various units have a little flexibility in how they carry out their programs, but they have to follow the guidelines and fit into the planning done in the central office. And they have to function within the severely controlled State civil service and fiscal systems.

We usually state our objectives in three broad areas—patient care, training, and research. The main reason for our existence is patient care, and research is to learn more so that we can refine our methods of patient care. In the past few decades the site of patient treatment has shifted away from State hospitals toward a variety of community facilities and programs. State hospitals have vigorously strived to avoid a custodial function. They have also tried to avoid a function of character-building for people with antisocial character disorders. Mental hospital administrators have tried to state their objectives as treating and rehabilitating patients with psychotic disorders and certain other psychiatric illnesses. They want to refuse people they consider social misfits rather than psychiatric patients, and they want to discharge after a while patients who are not improving, saying that they have achieved maximal hospital benefit. Yet, courts and physicians want to send to the hospital miscellaneous people who cause community problems.

So the issue is—can the State mental health program limit its objectives to those things it wishes to do or will other demands be made of it regardless of stated objectives? Negotiation on this occurs at the political level, and shifts may take place from time to time. For example, the mental health program in Hawaii may be requested by the legislature to get active in the prevention and management of drug abuse by juveniles even though we have not sought responsibility for this.

Can all the objectives of a State mental health program be stated in terms of measurable outputs? We have a staff group working on that now in Hawaii. We were surprised and distressed to realize that our thinking is almost entirely oriented toward mental illness and not toward mental health. We want to stamp out mental illness by early case finding and vigorous treatment and rehabilitation of all possible cases. But we don't know much about enhancing mental health and fostering the ability of people to cope with adversity. We are not sure which groups are at high risk of developing mental illnesses so that we know where to concentrate preventive efforts.

There are other goals in a mental health program which may not sound very worthy and are not on a par with such objectives as reducing the suicide rate. These goals are such things as meeting professional standards and qualifying for Federal funds.

It is highly important for a State hospital to gain and retain accreditation by the Joint Commission on Accreditation of Hospitals. So the budget request includes items that the hospital administrator would not want except to meet the demands of the joint commission. More elaborate fire safety equipment, more elaborate medical record indexing, and more tidy housekeeping may contribute little to the hospital's objectives for patient care, training and research and yet they have to be obtained.

Programs are shaped by Federal funding mechanisms. The goal of a State budgetary request may be to meet Federal requirements so that grants can be received. Of course, a Federal grant should not be sought in the first place if it does not make sense locally and fit in with local program objectives. But the way the federally supported program is developed may not be the way best suited to local conditions.

Major Federal programs such as the community mental health centers programs arise from political forces mixed with professional opinions and pressures. The elaboration of objectives of such a program comes later. Even now we do not have statements from the National Institute of Mental Health on objectives of the community mental health centers program in terms of quantifiable results expected.

None of us in government programs wants to be evaluated solely on what we put down on paper as to our objectives and our progress in meeting these objectives. We still want to show and tell—to have the Federal consultants, the Governor, the legislators, and the public see our facilities and programs and know that we are earnestly trying to do the good work we are trained to do. We want personal relationships with the decisionmakers so that we have some chance of being in favor and getting support and encouragement. But we can't go by forever on charm and dedication alone; we have to be able to show a desirable impact from our programs or we should not be in business.

EVALUATION METHODS AND DYNAMICS IN PROGRAM PLANNING

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Let me describe a division of statistics in a State mental health department I once visited. The statisticians reported that program managers often asked for data that was not available; data was being collected on the basis of "that's the way we've always done it" rather than on any other basis; managers, it was reported, had difficulty making their request for information in a quantitative manner; and many things were done which did not seem particularly useful or meaningful to the statistician who did them. I wonder this morning if this sounds familiar to anyone here.

I am in a division of research in which my fellow researchers are studying the behavior of animals. They have called my attention to the behavior of even the smallest of creatures, the single cell organism. Consider, for example, the parameciam. It collects data about food, threat, and the presence of other creatures or objects in its own way. It does not set up an elaborate data processing capability; all data is necessary to the function of the animal—there is no unnecessary effort. Consider man as a socially functioning organism on a much higher plane. Man has an amazing ability to collect and process information as he interacts with other men. He seems to have a natural tendency to collect that information most relevant to his needs.

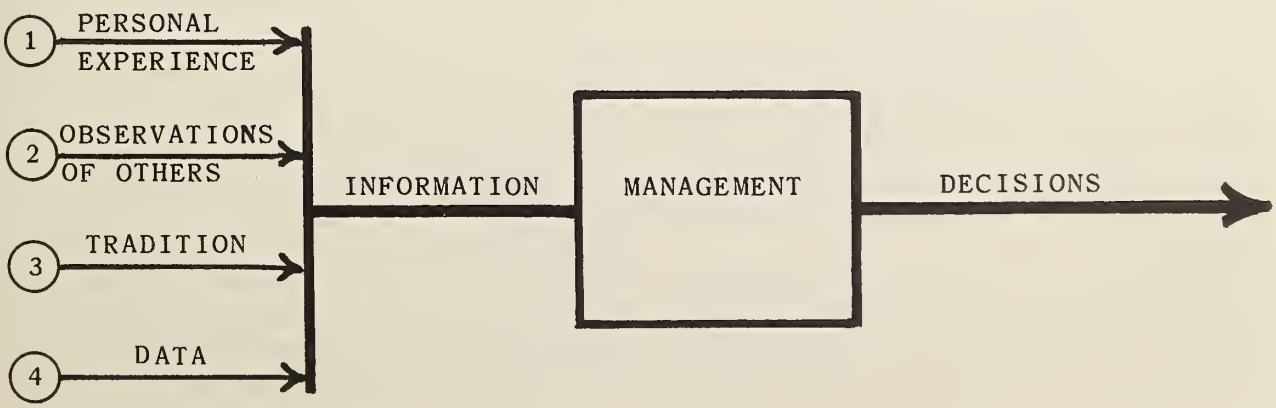
Organizations, including those in mental health, however, do not have the natural potential (a) for always knowing what information is needed for best operations and (b) for sorting through many irrelevant bits of data to get to nuggets of "information."

Managers in mental health organizations have as their primary output decisions about:

(1) Organizational goals,
(2) Allocation of resources,
(3) Identification of alternatives for reaching goals,
(4) Selection of the alternatives to be used,
(5) Assessment of organizational effectiveness.

Most often these decisions are based on personal experiences, the observation of others, and tradition; rarely are they based on data. (See figure 1.) On the other hand, mountains of data are available to mental health professionals. An examination of these data, however, reveals simultaneously a concern with a broad range of problems reflected in scattered and free-ranging research and a fairly narrow concern for data collected on a regular basis. Laboratories and field investigations have produced an overwhelming set of figures and research observations. At the same time, State and Federal statistical services collect epidemi-

FIGURE 1



ological data on incidence of institutional admissions, types and numbers of diagnoses, related socioeconomic profiles, length of stay, types of treatment, etc.

What has been the payoff? Dr. Howard Davis, Head, Applied Research Branch, National Institute of Mental Health, in a speech entitled, "After Evaluation, What?" notes, "A scanning of some 1,000 annotated citations dealing with evaluation in mental health yielded short of a dozen references which could be inferred to be devoted to the utilization of evaluation findings or change processes based upon effectiveness measures." This is a clear identification of a lack of vitality in the activities we currently call evaluation.

Sensitivity to the uncertainties of administering mental health programs has been all too rare. In short we are suffering from *data gluttony and information starvation.* "Program personnel just don't use our data" is a common complaint.

The topic for this presentation concerns evaluation and planning. We feel these have to do with management information needs—they do! But, unfortunately, the definitions we use of both are varied and often contradictory. The activities identified as "evaluation and planning" too often have little to do with our pressing problems.

Evaluation and planning represent efforts to improve our abilities to meet the mental health needs of the population. But questions of "what needs" of "what population" through "what means" are not answered.

I believe that to make

(a) our data meaningful to our managers,
(b) evaluation and planning meaningful to mental health organizations, and
(c) our organizations meaningful to people we need,
    (1) new ways of thinking about ourselves, our problems, and our information needs, and
    (2) techniques for implementing or making new notions operational.

Modern systems approaches have the potential to meet both conceptual and technique needs. Therefore, I would like first to review some basic systems concepts and then to look at how a systems approach can be used by mental health organizations for planning and evaluation.

A "system" is a set of elements or activities linked together in a purposeful way. A system is not a single grouping (an "assemblage") or a collection in which there is pattern in the relationship (a "systematically arranged assemblage"). In a "system" purposefulness is served by relationship and linkage.

To the degree that one can say the collection of activities, programs or behavior such as community clinics, patient treatment, administrative arrangements, and learning environments created within the domain of mental health serve a purpose is the degree to which such a phenomenon can be described as a "system." There is no assumption here that existing programs or structures are by definition systems. To define any mental health phenomenon as a "system" one should be able to determine its boundaries, the relationships making up the system, and identify its input and output.

The *boundary* of a system is the containing lines or set of lines within which the system operates, or where the system ends and the environment begins. *Input* is that which enters from outside the system, or its environment, and *output* is that which flows from the system to the environment. *Goals* are the system's reasons for existence or what the system wants to accomplish. A goal is a desired end state which the energies of a system are directed to achieve.

A way of identifying mental health counterparts to systems concepts can be shown as follows:

System Boundary	=	People-To-Be-Served
System Goals	=	Program Objectives
System	=	Program or Activities
System Input	=	Resources
System Output	=	Population Changes.

Purposefulness exists in systems in many forms. An electric motor is a relatively simple system with a fixed relationship between electrical energy input and revolutions per minute output. The goal of this system, built rigidly into it, is to transform electrical energy into mechanical energy. Such a system is goal-oriented. A goal-oriented system is one that has no potential for changing itself or its goals. It is closed and has no ability to interact in any meaningful way with its environment. This can best be illustrated by a torpedo shot through the water toward a target. If the target is missed, the torpedo continues on its projected path and could with an unlimited source of energy, continue indefinitely. The goal can in no way affect the path of the weapon once it is launched.

A higher order and more complex system is one which is *goal-directed.* Such a system is open to the environment for interaction as an essential aspect of the system's existence. Compare the close, goal-oriented torpedo with its technologically sophisticated sister the heat-seeking missile. The latter is constructed to collect and process information, in this case signals of heat

intensity, in order to continuously change its course of flight in seeking its target, a maneuvering jet aircraft.

Such a system utilizes the principle of *feedback* to maintain its vitality. The meaning of feedback has become clouded and ambiguous in popular usage. Feedback represents the process in which a system *utilizes* information about its current behavior to *guide* future behavior. Key words are "utilize" and "guide," not response or reaction. Berrien points out:

> Without the concept of feedback, it would be nearly impossible to understand how systems manage to survive and function even for short periods . . . . The importance of feedback derives from the fact that . . . it copes with a wide variety of disturbances that would otherwise disturb the steady state of the system.

In feedback-control systems, deviation from the goals creates information which is used to direct the behavior of a system. Feedback is not a blind, casual reaction to a force or stimulus. How the principle of feedback works in a purposeful, goal-directed system is shown in figure 2.

Mental health organizations are designed social complexities and can also be viable systems. Feedback would exist in the very structure of such organizations. The behavior and evolution of these organizations would be dependent upon the information the organization has about population needs, available resources and means to meet needs, and the basis for changing and modifying organizational behavior. Every mental health professional personally uses feedback in his daily work in relating both to individuals and the organization in which he participates. However, when feedback exists only informally or interpersonally, it does not necessarily constitute purposeful evaluation or planning.

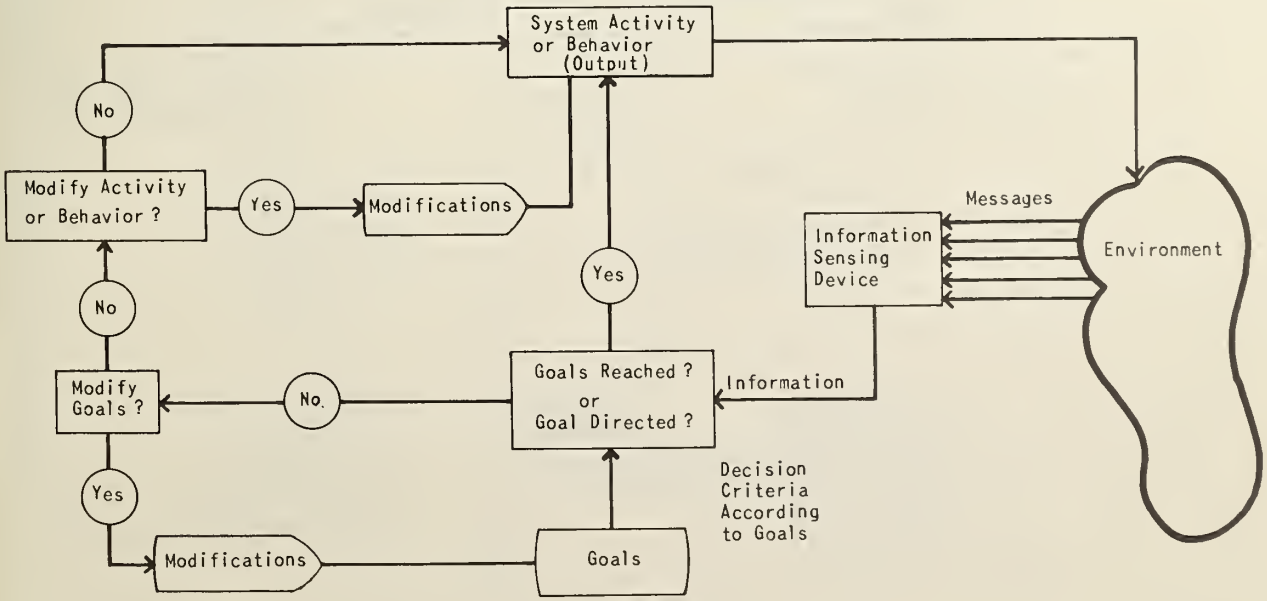
In a viable system "evaluation" and "planning" are essential parts of management and consequently the most desired feedback process in mental health systems. *Evaluation* is the process of determining whether a system has reached or is directed toward its goals in order that necessary modifications can be accomplished. *Planning* is the process of keeping the system relevant to the population to be served by defining and redefining goals and identifying organizational alternatives for reaching these goals.

Evaluation and planning are based on the special range of decisions made by managers about system activities. Without identifiable and publicly shared goals, evaluation and planning do not exist.

Evaluation can be called internal feedback, in which the output of the system is measured or compared with the desired output. Internal feedback loops are closed; information is internal to the system itself and is related to output through goals. Ability to change the goals for the system is not primary to feedback in this level. Assumptions for this internal feedback are necessarily made that the output of the system (its interaction with its environment) creates desired or valued states

FIGURE 2

Flow Diagram of a Viable System



in the environment in which the system is situated. For example, consider a program of inoculation against smallpox to provide immunization in a given population. Feedback compares the level of actual immunization against the desired level. The assumption is made that the desired level of immunization contributes to a state of health in the population, that is, a high percentage of the population not infected with smallpox.

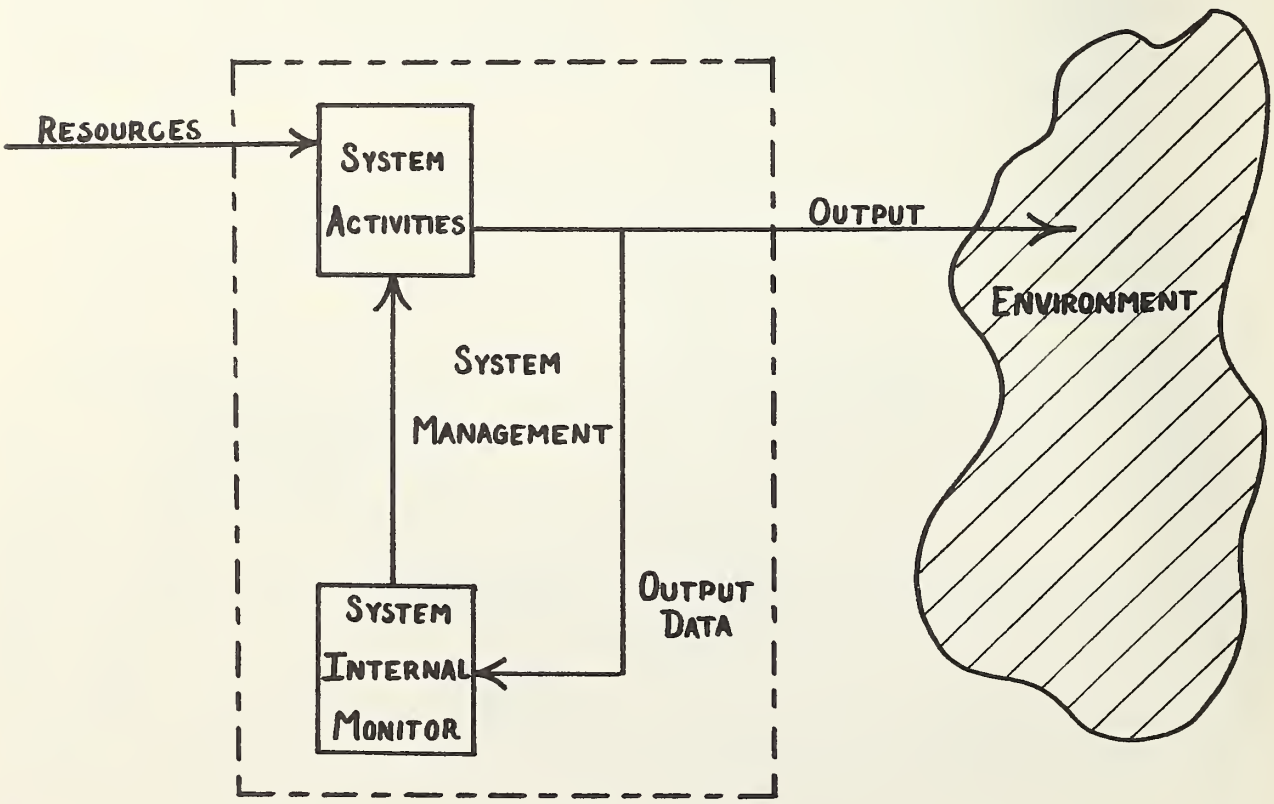
This loop is illustrated in figure 3. The activities of the system (inoculation) produce output (a protection level) for the environment (the target population). This output is monitored (a count of numbers inoculated and resulting level of protection) and this data is used by the monitor (those responsible for the program) to regulate the activities of the system (to increase or decrease the amount of, or alter the pattern of inoculation) according to the energy and resources available (vaccine, personnel, equipment, and candidates).

Planning is the external feedback loop. This loop is concerned with the relevancy and appropriateness of the system and its output to the environment or society in which it participates. Without this loop the mental health system would lack essential openness and would be limited to its own internally produced information. Through external feedback, the system takes readings on the states of the environment which society values and desires. The differences between internal, closed loops and external, open loops are illustrated by contrasting a normal heating system which maintains room temperature at a predetermined level and an environmental-monitoring system which determines the appropriate temperature level for the various periods of the day with a consideration of the number of people in the room. Such a system could keep records of how temperature varies and therefore learn (make adjustment over time).

Adjustment of goals are the primary output of the external loop as the system works to maintain a match with the desired state in the social environment. In the case of the immunization, this loop would determine socially-valued goals of personal health or the level of

FIGURE 3

A Closed Feedback Loop



"disease-freeness." The loop would identify what diseases are most unacceptable and what protection level for what percentage of the population is desired and translate this into operational goals for the total system. This loop would also check the validity of the assumption that inoculation contributes to states of disease-free health. Figure 4 illustrates the coupling of an external feedback loop with the internal loop.

As a general observation, it is rare to find either internal or external loops formally and purposefully existing in mental health organizations. Our organizations more frequently take on the character of goal-oriented systems like the torpedo.

One major reason why evaluation and planning often do not exist is the lack of relevancy managers see in activities often labeled as such. If evaluation and planning do not exist as a central part of management they do not exist; in other words, the essence of evaluation and planning as a feedback process is contained in management, not outside it.

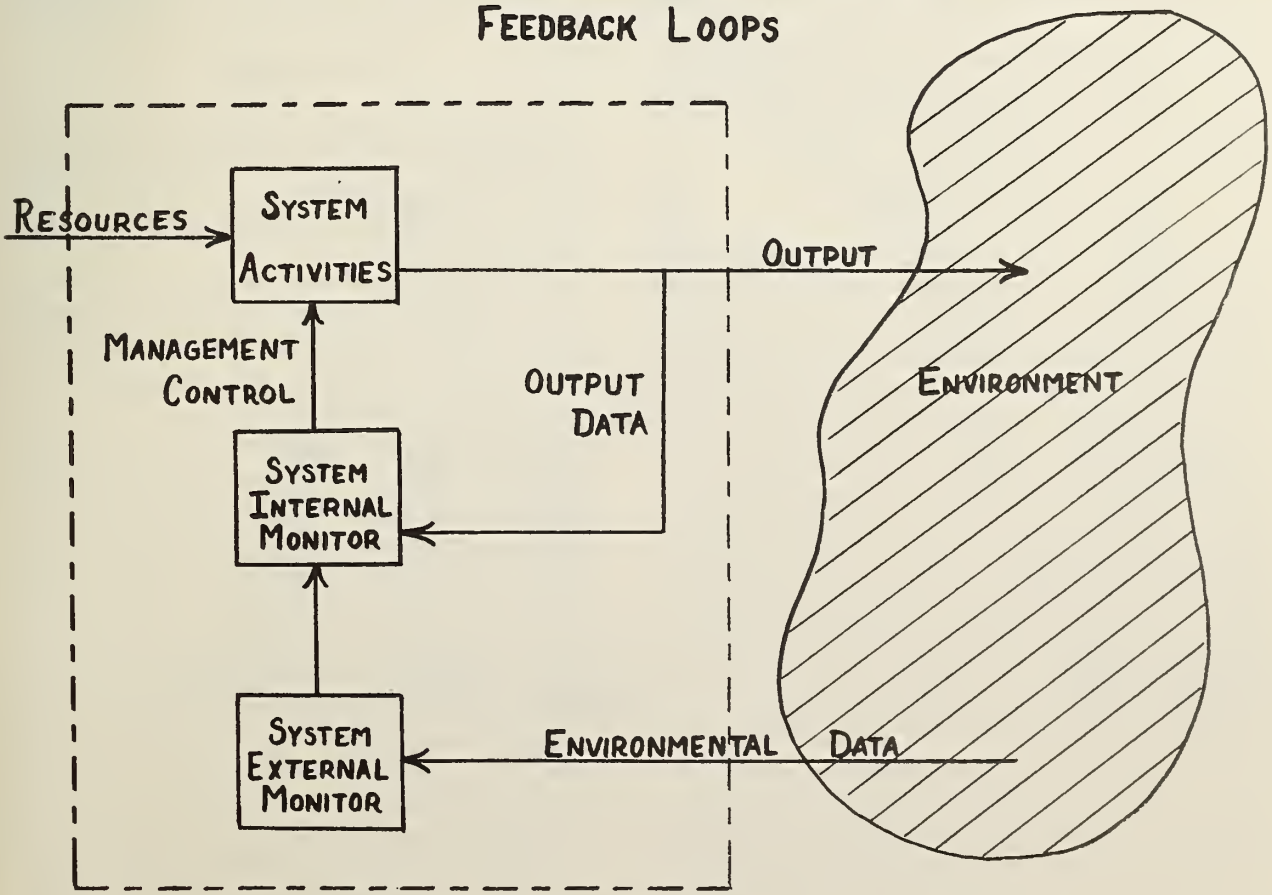
The notion of a system and the cycle of feedback to assist a system in purposeful change as the environment changes is necessary in understanding both planning and evaluation. Evaluation and planning are built into a system to maintain the desired balance or interaction between the environment and the system in the case of mental health between our clients and their communities and the formal social organizations of which mental health activities are a part.

We now have a basis for thinking about systems. What is meant by a "systems approach?" What are the techniques? Unfortunately, such things as computers, mathematical systems, and flow charts are the popular manifestation of techniques. They are actually tools—physical or conceptual instruments like tables of random numbers. Techniques are the way of using these tools to deal with problems. Techniques of systems analysis are the ways of using systems tools.

The basic techniques of steps for systems analysis are concerned with boundary definition, system defini-

FIGURE 4

SYSTEM WITH INTERNAL AND EXTERNAL FEEDBACK LOOPS



tion, goal definition, decision criteria, and system modification. To use a systems approach to organizations would involve the following questions:

(1) What is the boundary?
(2) What are the goals?
(3) What is the system?
(4) Is the system headed toward its goals?
(5) What adjustments of (a) the system and (b) the goals are necessary?

I. The Boundary

A boundary is the population actually served by or related to the human-serving system of which mental health defines itself to be a part. All boundaries are arbitrary limits and exist in the minds of their creators or definers. Therefore, boundary analysis is to establish the working limits of primary concern to a mental health program. For example, the working boundary may be only those people who are directly treated or the population of people directly served by a mental health program and other agencies with which mental health has primary and defined linkage such as public schools or welfare. The boundary could be all public and private organizations which relate to the problems of people or view people as problems. Thus boundary analysis is to define the most general level of concern for a mental health program. In other words, what is the population which is primary in the working arrangements of the mental health program?

II. Operational Goals

A goal is a desired state which an organization wishes to achieve. Too often organizational goals are a mixture of personal goals and/or private, nonstated goals. As such they cannot provide direction. Goals are not always concerned with organizational survival or growth, for many service organizations lack well-defined social purposes but exist on the basis of potential for survival and ability to consume existing resources. Goals exist at a variety of levels within an organization, ranging from those most immediate and short-term to those most universal and long-term. Goals, while varied, must not conflict or be independent; rather they must be complementary and congruent. Goals at any level in an organization must be related to all goals at higher levels. Goals can relate to each other in a variety of ways. Figure 5 illustrates how organizational goals at lower levels (shown by higher numbers) are linked to goals at higher levels (shown by lower numbers) with all goals linked to the general purpose of the organization (level 1). This means that any goal at a given level should be logically linked to at least one goal at a higher level such that a "goal tree" is created. In figure 5, the left hand branch is the more "theoretical" branch, whereas the "mixed" branch is more likely in real life. Many other combinations are, of course, possible. To coordinate energies toward this goal, an organization requires a way to measure this goal. Without measurement the degree of goal-directedness or undirectedness cannot be determined. Progress toward any goal is subject to variation. Therefore, we must know or measure the degree of direction toward or direction away from goal attainment. This requires a decision rule or way to know an acceptable variation away from the goal. Figure 6 illustrates a plot of a system operating with acceptable variation. The bank of allowable variation may be constant or it may narrow such that the amount of acceptable variation away from the goal is reduced over time.

A system monitors its goals through data about exception (unacceptable deviation) from its goal. If deviation is detected then adjustments must be made. A goal to be operational must provide (1) a way of measuring a desired outcome and (2) decision rules (road signs) for determining closure toward the goal.

III. The System

A system is made up of elements or subsystems linked together by input and output. Therefore, mental health systems are sets of programs or activities which mental health controls or of which mental health programs are a part.

Designed systems are those created for defined purposes. *Natural systems* are those which grow and evolve naturally without design out of the combination of available resources and activities. Unfortunately for applying systems analysis in a direct manner (Given a goal or problem, what designed system is needed?), we must take as given existing organizations and seek to bring about meaningful change. This is something like rebuilding an automobile while it rolls down the street.

In terms of information systems, we are at a point of evolution in moving from existing styles of identifying, collecting, and processing important data to newer more meaningful styles. Information needed by mental health management is not limited to goal measurement. As important in the design and modification of a system is examining the *alternatives*. Given a goal, what are the alternative ways for reaching the goal? Figure 7 illustrates the kinds of information which are required in choosing among alternatives. Thus, management requires information about:

(1) The alternatives for reaching goals,
(2) The costs of each alternative,
(3) The possible outcomes,
(4) The payoffs or values of the outcomes,
(5) The possibilities a probabilities (Pij) of that the *ith* outcomes will occur if the *jth* alternative is implemented.

How many of us can provide such information to management now?

IV. Modifications

Evaluation is concerned with an examination of programs as exception from goals is detected. Planning is concerned with examining the appropriateness of existing goals (and thus programs) over time for meeting the mental health needs of people.

How can this systems approach be integrated into a mental health organization? Figure 8 illustrates the integration of conceptual and theoretical activities, research and testing activities, and implementation and application activities with the five phases given for using a systems approach to planning and evaluation. The intersection of an activity category with a phase presents the specific tasks which might logically occur as a result. For example, theoretical-conceptual questions about system definition are those of "what

Figure 5

ILLUSTRATION OF A VARIETY OF LINKAGES
BETWEEN GOALS OF DIFFERING LEVELS
IN AN ORGANIZATION

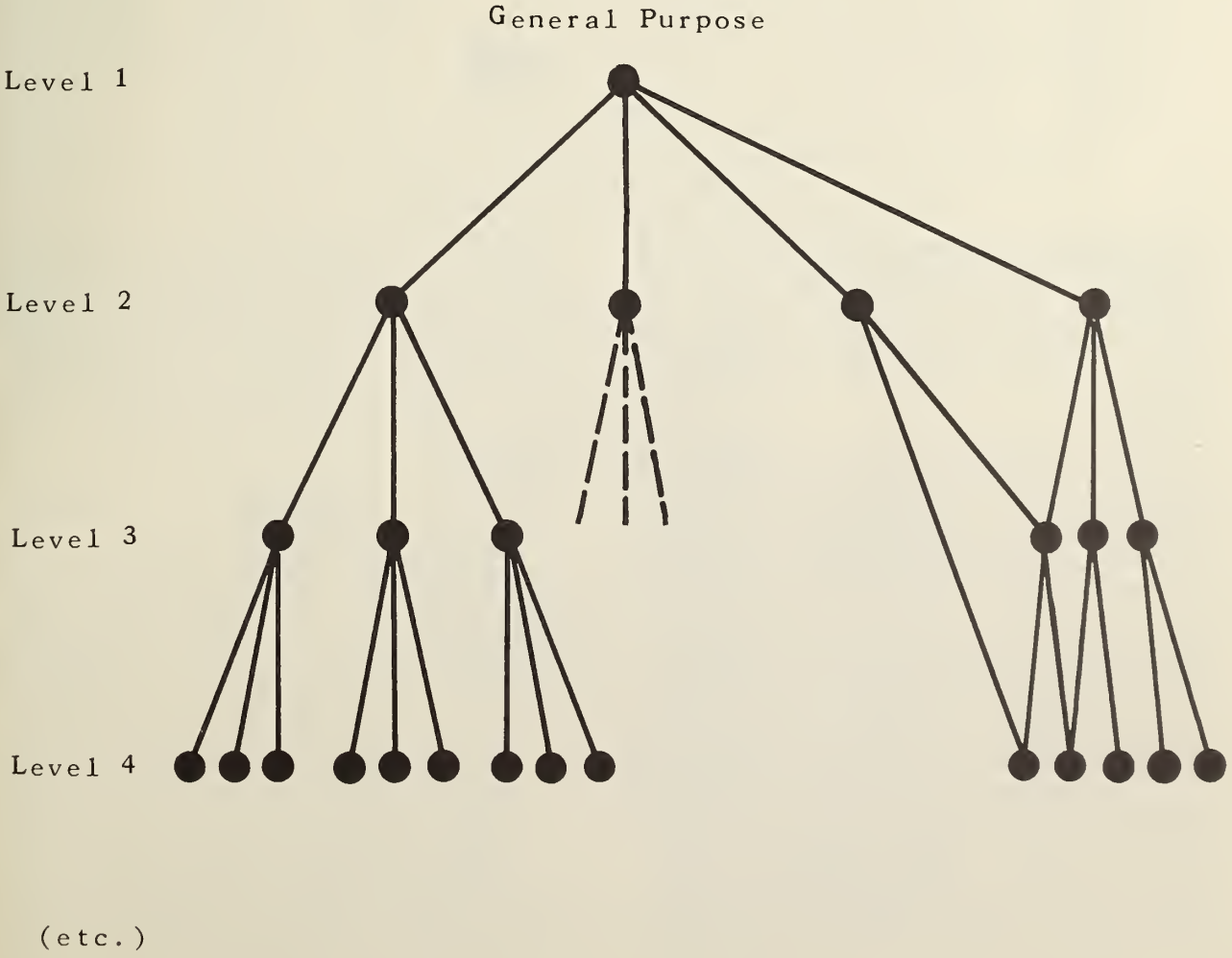
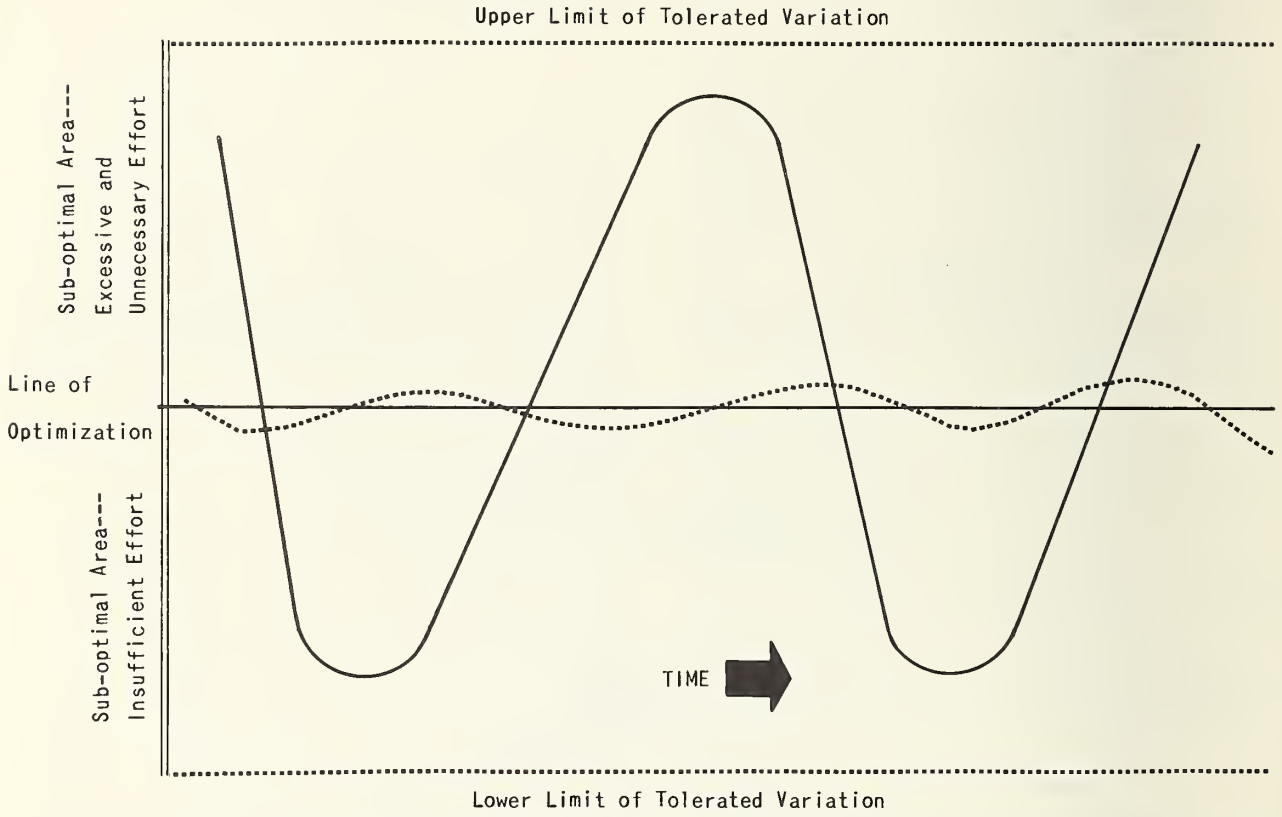


Figure 6
CURVES SHOWING TWO POSSIBLE TYPES OF SYSTEM EFFICIENCY



is the boundary of the system" and "what makes up the system?" Those tasks shown are suggested and not necessarily the only ones possible. The matrix does illustrate the dynamic interplay between the varied components of the systems model for planning and evaluation.

Essential in systems planning and evaluation is decisionmaking. Decision represents the control and judgment aspect of management. Without management decisions there is no planning and evaluation. Often administrators expect evaluation and planning to be the domain of research or of evaluation and planning specialists. But researchers and specialists can act only as supporters, designers, mechanics, or engineers; they are not the primary element. On the other hand, evaluation and planning needs information. Data alone have no meaning with decision capability. Since feedback and thus evaluation and planning are cycles and are not single isolated tasks in a system, information must be continuously available. Thus the notion of a management information system which collects, processes, analyzes, and disseminates data to managers is central in a mental health system.

Research and, in general, all data collecting mechanisms, to be a part of a system, must be linked directly with the information needs of decisionmakers. In other words, they must be judged according to the utility of the information each generates in support of management. A system is concerned with utilizing rather than generating data, with management rather than investigation.

Conclusion

To summarize, a mental health organization viewed as a system requires a comprehensive program for the acquisition, dissemination, interpretation, and storage of relevant information. Such information is of three basic types:

(1) External—concerned with the environment in which the mental health system operates such as the population-to-be-served, community profile and needs, available resources, mental health problems and community structure which affects and can affect mental health efforts.

(2) Intrasystem—concerned with the behavior of the system, the nature and activities of mental

Figure 7

MATRIX OF A DECISION SITUATION

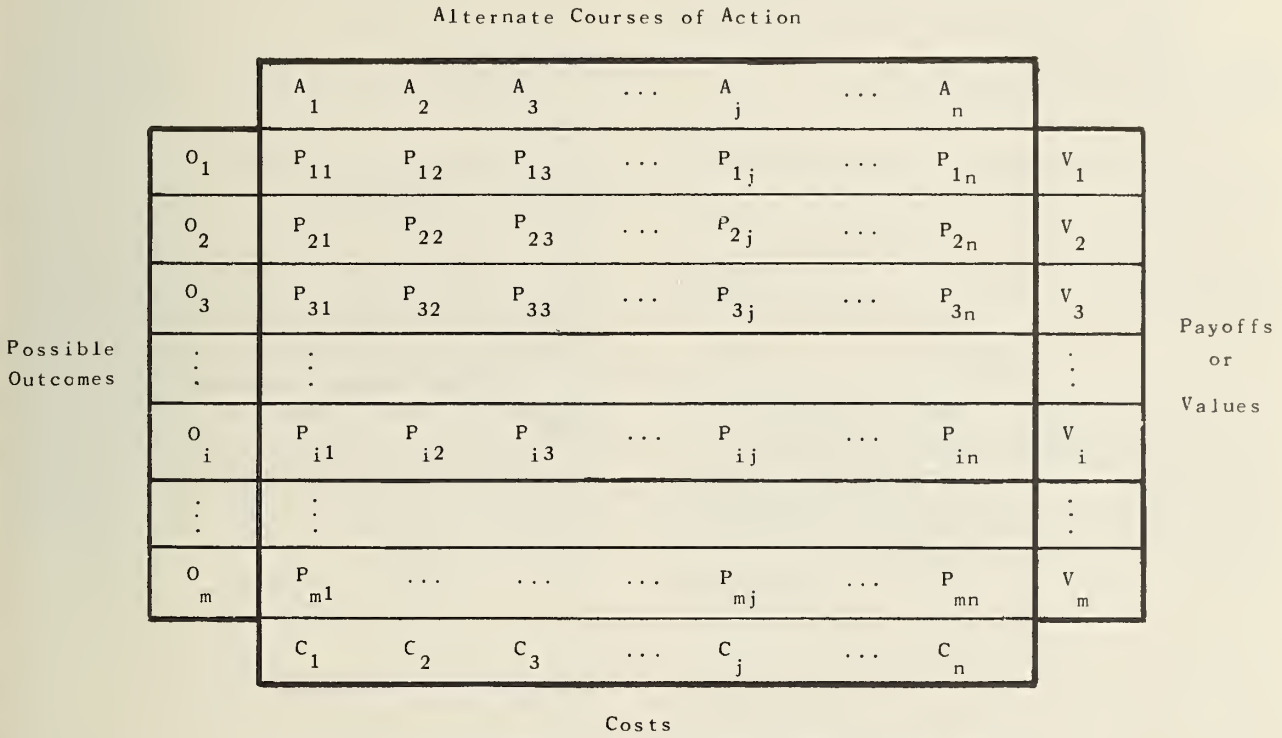

Alternate Courses of Action
A1 A2 A3 ... Aj ... An
O1 P11 P12 P13 ... P1j ... P1n V1
O2 P21 P22 P23 ... P2j ... P2n V2
O3 P31 P32 P33 ... P3j ... P3n V3
Oi Pi1 Pi2 Pi3 ... Pij ... Pin Vi
Om Pm1 ... ... Pmj ... Pmn Vm
C1 C2 C3 ... Cj ... Cn
Possible Outcomes
Payoffs or Values
Costs

FIGURE 8.—*Matrix Illustrating Utilization Of General Systems In Mental Health*

	System definition	Goal statement	Prediction—planning	Message retrieval and dissemination	Evaluation—goal direction
(1) Theoretical Formulation and Model-Building Activities	Develop conceptual model of mental health systems.	Link theoretical model with operational goals. Simulate to determine possible outcomes.	Develop prediction models of population and community needs and available resources. Simulation of models under a variety of planning strategies.	Develop models for information-gathering.	Develop management models.
(2) Research and Testing Activities	Establish operational definitions of theoretical system models and test accuracy and applicability.	Work with participants to obtain goal statements and make operational. Determination of long and short-range goals with appropriate target dates.	Obtain information about potential mental health needs of population and communities and available resources. (Staff-facilities-supplies)	Determine information needs of each decision-point. Develop information-gathering techniques. Evaluate and sharpen research tools.	Develop and sharpen criteria for evaluation.
(3) Implementation and Application Activities	Pilot use of conceptual models to determine applicability.	Use of goals to aid system purposefulness.	Use of information provided by models and empirical investigation to determine required goals and related activities to meet future mental health needs.	Gathering information about population and communities served and mental health activities. Summarization and dissemination of information relevant to each decision-point. (Information about what is actually being used with what effect.)	Evaluation of activities in terms of stated goals. Determine if most effective use of resources being made. Evaluation of goals. (Compare use of resources with planned use.)

health and the people it serves, facilities, fiscal activities, direction toward goals.

(3) Intersystem—concerned with the interaction of the system with its environment, such as the impact of mental health efforts on society and vice versa, the linkages between mental health and other service agencies.

All which has been said implies: If we adopt a systems approach to planning and evaluation and thus to mental health organizations, then information needs will change drastically. The role and place of the mental health statistician will also change drastically and will become even more central and more meaningful in management.

Postscript

One way to respond to this presentation is to say, "That's all-theoretical and not very applied."

Yes, that is in part a valid response. All of us feel under pressure to get quickly-applicable tools and techniques. We want patient-rating scales, reporting forms, and research designs. In our haste we seize on such tools and techniques with little understanding of their basic assumptions and conceptual underpinnings and their potential relevance. Therefore, we often put band-aids on serious lacerations and send the body back to do battle.

Systems analysis, as well as other alternative approaches to planning and evalaution, will mean little to nothing in our organization unless the organization internalizes, understands, and appreciates the approach. Unless the mental health professional realizes the potential benefits to him and his efforts to serve people, our research and statistical tools and techniques are destined to be more ritual than program reality.

One temptation for any systems advocate is to talk about computer simulation and perturbation analysis, queing theory, linear programing, game theory, and decision theory as very sophisticated techniques of systems analysis and operations research. But for all their glamor, they are an empty exercise unless they are a part of management.

METHODS FOR MEASURING NEEDS FOR MENTAL HEALTH SERVICES

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The tools for measurement of needs for mental health services are largely dependent on the way needs for mental health services are defined. Thus we have to ask the questions, who defines the needs for services? In what framework are the needs conceptualized, medical, social, personal? What is the relationship between needs for services and utilization of services? These issues cannot be side-stepped because they have direct relevance to the methods for measuring needs.

To gain perspective on these issues I will discuss:

I. Definitional Problems of Need:
   a. Mental Illness Concepts and Treatment Modalities;
   b. Phases of Developments of the Person;
   c. Utilization of Services.

II. Methods for Measuring Needs for Mental Health Services:
   a. Reporting of Utilization of Mental Health Services;
   b. Survey Methods;
   c. Areas and Behavior;
   d. An Ecological Method.

I. DEFINITIONAL PROBLEMS OF NEED

a. Mental Illness Concepts and Treatment Modalities

About a century ago there was an air of optimism in professional medical circles about the advances in medicine. Psychiatry as an offshoot of medicine shared in this optimism. Thus, mental illness was seen in the same way as other illnesses, particularly the most shining examples, the infectious diseases. Mental illness could be described by its symptomatology, its course over time and its outcome and in time we would discover the causes. It was indeed a very promising direction. Out of this medical viewpoint came the description of many forms of mental illness. (*1*) Over a period of about half a century the various subforms of schizophrenia were differentiated and described, and currently these are categorized under schizophrenic reaction. A similar development occurred with the description of the affective psychoses. At the same time major progress was made as to the differentiation of the global causes of the illness. The organic brain syndromes were separated from the functional psychoses. Furthermore, within the group of the organic brain syndromes differentiation as to the causes became clearer, such as infectious, circulatory, toxic, neoplastic, degenerative, etc. A similar differentiation occurred in the nonpsychotic conditions with the description of the neuroses and the personality disorders. Disappearing from the psychiatric vocabulary were descriptions such as weak willed and immoral personality. All the categories shared the assumption that mental illness was something *within* the individual and that in time treatment methods would be developed which would either stop the progress of the disease or modify the biochemical abnormality, etc., in the same sense as arsenic, bismuth, and penicillin are treatments for syphilis, and electroshock and antidepressants are treatment for the affective disorders. A nonorganic conceptualization of mental illness was espoused by the mental hygiene movement early in this century. There was a strong emphasis on the prevention of mental illness and thus on methods of child-rearing and habit formation. This movement found operational expression in the child-guidance clinics.

Another conceptualization of mental disorder was that psychopathology could emerge as a function of the interaction *between* people. Similarly if it could emerge this way then also treatment methods could be designed in an interactional framework to stop symptoms and prevent them from recurring. Within this general framework the concepts of therapeutic milieu, therapeutic community, milieu therapy, and some forms of group and family therapy emerged. (*2, 3*) This last conceptualization does not place the illness *within* the person but it is a function of the

interaction *between* persons and this; then, is logically an emphasis on the structuring of the social psychological milieu.

Many issues are still unresolved. Is social incompetence, failure to adapt to the demands of society, a form of mental illness? (*4, 5*) Is unhappiness, lack of satisfaction, and inability to cope a form of mental illness? It is true that many mentally ill are socially incompetent, unhappy, dissatisfied, and unable to cope. Many indices of personal and social functioning cannot be ignored, which we will discuss in methods of measuring needs for mental health services.

b. Phases of Development of a Person

Many theories of personality have always stressed the importance of early phases of development of a person. The successful integration of the experiences of living in one phase of the development would constitute a solid baseline for meeting the stresses in subsequent phases of development. Developmental psychologists have stressed that to pass from one phase of development to another is frequently accompanied by a period of relative disintegration. Those periods of disintegration are sometimes characterized by erratic, moody, withdrawn, hyperactive, seemingly nonpurposeful behavior. This is the way we tend to describe, e.g., adolescence as a phase of development. However, later in life there are also important transitional phases. At each phase in the development of persons, new levels of integration occur. It is still unclear at what period of a person's life he achieves his maximum level of integration. Some people seem to have a progressively ascending life line, and others seem to start descending in terms of level of integration. In this culture we seem to be able to do better with mastery of new challenges than with having to realize limitations of self and the loss of attributes. At many points during the life of a person, important crises occur. Crises are periods of transition accompanied by personal disintegration. Bereavement of an important person is such a crisis. Losses do not only occur in the form of death of a person. A severe loss may be the loss of youth, of vitality, the loss of a job, the inevitable realization that there is no further promotion in sight, the relative loss of being bypassed, etc. (*6, 7, 8*)

When we measure at any time the needs for services within the general population we can expect to find a large number of people who are at that particular point in the period of transition, in a state of disintegration. Generally those periods are characterized by a number of signs and symptoms which easily could be stated in terms of mental illness. Generally, however, the person would not consider himself mentally ill or emotionally disturbed and neither would those in his immediate environment. The resolution of these conflicts, of these crises of transition, are not purely a matter of happenstance. Significant persons in the immediate environment present models for coping with these crises, and at times institutionalized rituals, such as funerals, initiation rites, are time tested prescriptions for coping. Unsuccessful resolutions of those crises may result in a drift toward the psychiatric care system. (*9*)

c. Utilization of Services

The relationship between the fractured bone and medical attention for the condition is clear-cut. Such a direct relationship does not exist between emotional problems and the delivery of mental health services. Various studies have demonstrated that there are many gatekeepers in society caring to some extent for the mentally ill. In order of importance they are ministers, nonpsychiatric physicians, psychiatrists, etc. (*10, 11*) Furthermore, the more severely mentally disturbed persons on the welfare roles are cared for by welfare workers. (*12*) Rarely are the highly trained professionals involved with these persons. Thus utilization of formal psychiatric services may in no way reflect actual potential consumer needs. In some instances flagrant psychopathology of a person is not defined as ill but eccentric. (*13*)

Another aspect of utilization of services is that the services are frequently not known and the known services may be avoided because of the stigma attached to being considered mentally ill, or incompetent. Many facilities have learned that, over time, more and more persons tend to come on their own and with minimal coercion, and this is frequently in sharp contrast with the initial period of service delivery of a facility at which time many persons were brought by the arm of the law.

A totally different aspect of help-seeking behavior can be found among the "sophisticated." To be in psychoanalysis or psychotherapy can be a mark of distinction and fashionable in some affluent circles. (*14*)

There is also increasing evidence that utilization of outpatient services may be a function of life styles. Some patients tend to use inpatient services only and when assigned to outpatient services, regardless of kind, individual therapy or day hospital, drop out in the early phases, or never come. Others appear to be perpetual consumers of services of any kind. This phenomena is not just related to socioeconomic class but to the appetite for psychiatric services, and probably other human services. (*15*)

The separate reporting of outpatient and inpatient statistics has obscured these phenomena. Only since attention has been paid to the construction of treatment centers has a tentative typology of user type emerged.

The preceding discussion about concepts of illness, phasic development of a person, and utilization of services demonstrates many potential pitfalls in relating measurement of mental illness to need for mental health services. Thus, with a great number of reservations, we can now move to the second part.

II. METHODS OF MEASURING NEED FOR MENTAL HEALTH SERVICES

a. Reporting of Utilization of Mental Health Services

It is not surprising that only those hospitals who depend on public money use a reporting system. Thus the data obtained reflect rates of hospitalization in public facilities by age, sex, diagnostic categories with an overreporting for patients in the lower socioeconomic class and those with severe chronic illnesses. There is still not a uniform reporting in the United States which includes all private and public institutions. This is regrettable because the reporting system has never violated the rights of individuals. In addition, more information is available in the public and private nonprofit institutions. The more widespread the use of general hospitals for psychiatric services becomes, the more crucial it will become to integrate information available from various sources.

Magnificent work has been done with an inadequate reporting system describing utilization of public hospital beds, needs for the future, the ever increasing number of admissions, the reductions in hospitals census starting in 1954, shifts in hospital use for various age groups, diagnostic categories, etc. (*16*) There is an unfortunate tradition in reporting which separates outpatient from inpatient statistics. This artificial separation reduces the value of both reporting systems, particularly now that outpatient services are more varied and more utilized. The few case registers in operation require close scrutiny as to their utility and expense. We should consider the possible advantages and disadvantages of less-expensive methods, such as the prevalence of 1-day treatment of veterans in public institutions, and the utility and cost of 1-day treatment prevalence study versus 3 months or possible 1 month application for service studies. Each method has its advantages and disadvantages in relation to specific goals, but these studies are necessary to arrive at the most economical and least cumbersome reporting system. The data obtained from various efforts need to be examined against the data obtainable from a case register. Currently some efforts have been started to record not only formal psychiatric services but to integrate these with utilization of all social agency services. These projects are explanatory in nature, but they may reveal that continuity of care cannot be achieved as long as we accept the traditional fragmentation of health, mental health and social services. Acceptance of the fact that the mental health service delivery system is only one part of a complex network of services might lead to a more comprehensive and less fragmented system of services, and thus also of reporting of services. If this is the direction we go the reporting system may very well come much closer to being a reflection of the experienced need for services.

b. Survey Method

This is an established method and has been used extensively by demographers, human ecologists, social psychologists, and public opinion researchers. The size of the sample depends on the issue to be clarified. To illustrate, I will give you the logic of one survey. The problem we tackled is the prevalence of undiagnosed mental illness in the general population. From information collected on persons we know that some have subsequently sought help or had recent contact with the Western Missouri Mental Health Center. It is estimated that 3,000 respondents would be necessary to produce a cohort of 50 contacts within 1 year (18 years of age and over). The margin of error is plus and minus 25, so that the range of the cohort would be approximately between 25 and 75. This information is based on comparative register data in Monroe County, N.Y. (*17*)

Since the requirements are to interview only persons 18 years old and over, and since the rates of completed interviews runs about 75 to 80 percent, the required sample size in order to obtain 3,000 interviews would be 4,000. An updated city directory indicates that the area we intended to cover contains 157,000 dwelling units. This means a sampling interval of 39 to obtain the necessary sample size of 4,000. The crucial issue is that each dwelling unit has an equal chance to be selected as part of the sample. Thus, if nobody is home in unit 39, the interviewer cannot go to unit 38 because unit 38 had a chance to be selected in the original sampling decision. Specific procedures are used to account for the "discovery" of new dwelling units created after the city directory was compiled, and thus insure that each adult in the household has an equal chance

to be interviewed. As you can imagine, there are many problems in finding people at home and gaining entrance and participation.

Equally important issues are: What to ask? How to ask? What kind of "interviewer" is necessary to do the job? If the focus is to determine needs for mental health services, the interviewer should be able to elicit differentiation between a variety of conditions such as chronic psychotic conditions, alcoholism, crippling versus mild neurotic conditions, current life crises, developmental phase problems, etc. These problems of definition are reflected in the wide range of rates of mental illness found in various studies. A study reviewing surveys (*18*) describes rates ranging from 20 to 330 per thousand. This broad range has led to greater use of more qualified interviewers, even psychiatrists. (*19*) You can imagine what this will do to the cost of a survey. On the other side of the coin, efforts are made to develop simple test instruments with power to distinguish the well from the ill. (*20*)

Furthermore, the distinctions being made should have some relevance to the kind of treatment needed. Some recent studies indicate that the decisionmaking processes in psychiatric facilities about the assignment to treatment modalities is far from simple and is frequently less related to the state of psychopathology and more to the power and forcefulness of complainant as well as past treatment history of the patient. Thus survey methods as a tool to measure need for mental health services suffer from many imperfections.

c. Area and Behavior

Problems experienced by people can be defined as need categories such as depressions, schizophrenia, school dropouts, criminal behavior, unemployment, etc. The question is about their relatedness. Recent studies have focused on the socioeconomic class and mental illness, and kind of treatment received for the mental illness. Attempts are currently made to integrate delivery of a variety of human services such as welfare, health, and mental health. These illustrations serve to indicate broader awareness of the complexity in the delivery of mental health services.

An important issue is, are there characteristics of area which will permit a study of the relationship between environmental conditions and behavioral manifestations. Various investigators (*21, 22, 23*) have taken this idea seriously and have developed methods to analyze these relationships. This approach requires characterizations of environments such as conditions of housing, characteristics of population, living arrangement in those areas. Examples of behavior characterizations are crimes committed by people in the area, arrest for drunkenness, help-seeking behavior from a mental health center, receiving public assistance, ways of dying (death certificates), library use, school dropouts, completion of high school, aspiration level, etc. These kinds of data can be analyzed cross-sectionally and longitudinally. Theoretically it will become possible to discover a number of areas which are alike in some ways and markedly different in other ways, e.g., Area I and Area II may be alike on numerous characteristics except two, such as hospitalization rate for mental illness, and dominant family structure. Such a finding could then lead to a comparative study of the two areas focusing on the relationship between aspects of family living and hospitalization for mental illness. Furthermore, other analyses on area characteristics may demonstrate the total unrelatedness of certain behavioral indices and conversely the clustering of other variables, comprehensible by one unifying concept.

I foresee many practical applications of these kinds of studies such as generating explanatory concepts relating mental illness to environmental conditions, providing guidelines for planning and measuring the impact of intervention.

d. Ecological Method

Up to this point I have discussed data collection and analytical approaches which deal with broad categorizations. The next necessary step is an approach to describe with precision the matrix of living in a small area, for example, a block in the city. Only when we have a more detailed account of the way life is being lived can we hope to measure impact of mental health services upon the quantitative and qualitative elements of the matrix of living. The approach is well developed for rural communities and will be modified for urban life. (*23, 24*) Against the background of knowledge about normative behavior within a small area, failure to cope, becoming a patient can be understood better and intervention methods can be tailored for individuals, families, or specific target population in a small area.

Furthermore, if large and small intervention programs, such as poverty programs, model city programs, CMMH center programs, have no noticeable impact on the quality of living within a study area, the inevitable conclusion has to be that the stated goals are not achieved and thus alternatives need to be considered.

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MEASURING CHANGE IN PSYCHIATRIC PATIENTS

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Today, most investigators interested in evaluating the effects of a treatment procedure will rely on a rating scale to measure these effects in psychiatric patients. Consequently, the main thrust of this paper will be on psychiatric, nurse, patient self-report, and social and psychiatric history rating scales and their use with psychiatric patients. However, it is important to bear in mind that projective and psychomotor tests and analyses of verbal behavior, to cite a few examples, have also been used, and continue to be used as change measures with mental patients.

Advantages of Quantitative Rating Scales

Lyerly and Abbott (1965) note four advantages of quantitative rating scales. The first is as an interview guide. All of the significant symptoms, attitudes and behaviors are listed on the interview form assuring a more complete coverage of possibly relevant data regarding the patient. Consequently, there is less likelihood that significant symptoms or behavior will be missed. Ratings scales also facilitate communication among professional personnel. Since the scales are completed in a uniform manner and the items generally describe relatively simple and discrete bits of patient behavior, the possibility of misunderstanding or misinterpretation among psychiatrists or nurses is minimized. Rating scales also provide a record of treatment progress. Effects on symptoms and other behavior as a consequence of various treatment procedures may be evaluated and trends over time noted. Finally, as the data from rating scales is in an objective and numerical form, it can be subjected to statistical manipulation and used for research purposes.

Reliability

The reliability of a scale or test may be measured in a variety of ways, however the term generally refers to errors of measurement in a scale or test as reflected in differences in ratings or test scores from a hypothetical "true" value. The smaller these differences the more reliable the scale.

Indices of reliability. One very simple measure of reliability may be obtained by computing the correlation in ratings between two or more raters. For continuous data, such as ratings on a five-point scale, a Pearson product-moment correlation may be computed. For discrete or categorical data, true-false items, for example, a contingency coefficient would be suitable.

Another widely used method of assessing reliability is the test-retest coefficient; i.e., the correlation between sets of ratings made at different times. This index of reliability is useful for measuring the stability of traits or characteristics over time. This would be a suitable index for variables, such as stable personality traits, that are not expected to show significant changes as a consequence of time. However, in work with mental patients, particularly when one is interested in evaluating the effects of an active treatment procedure, this would be a poor measure of reliability as one would expect dramatic changes in the patient's behavior over time.

Estimates of reliability may also be made to reflect the extent to which items in a scale show internal consistency, i.e., "hang together" with regard to an attribute or trait they are presumed to measure. Split-half reliability coefficients are one example of a measure of internal consistency. The intraclass coefficient is another example of an internal consistency measure. The intraclass coefficient is particularly useful in situations where there are two or more ratings for each patient but they are not made by the same set of raters.

Ebel's (1951) analysis of variance technique for estimating intraclass coefficients is a useful device in large collaborative studies involving many raters from many hospitals. Using this technique, it is possible to compute a measure of interrater dissimilarity in level of ratings (called "level difference") and a measure of interrater dissimilarity due to nonsystematic differences (called "random difference"). Level difference, the percentage of level of total variance, reflects the

tendency of one rater to consistently rate the patient higher or lower than the other rater. Random difference is the percentage of error variance, excluding level variance, to total variance.

The question of how large a reliability coefficient should be to justify the use of a scale or test has no simple answer. For clinical purposes involving decisions on the treatment of a patient, the clinician wants quite high reliability, i.e., in the 80's or 90's. For research purposes, to demonstrate treatment effects, lower reliabilities can be tolerated.

How can one enhance or increase the reliability of a rating instrument or conversely what are some of the sources of unreliability in rating scales? First and foremost, the scale items must be unambiguous, and insofar as possible, should not rely on clinical judgments. In other words, the item should "mean" the same thing to the different raters. Occasionally, this criterion is difficult to achieve and can only be achieved after a series of training sessions with the raters. Secondly, the items should describe relatively simple and discrete bits of behavior. Thirdly, a number of psychiatric rating scales such as the Brief Psychiatric Rating Scale (BPRS; Overall and Gorham, 1960) and the Inpatient Multidimensional Rating Scale (IMPS; Lorr, Klett, McNair, & Lasky; 1963) are completed following a standard psychiatric interview with the patient. Consequently, the ratings are based on recall. If the rater is not too familiar with the rating instruments it is also possible he may have failed to question the patient in certain areas and so is unable to answer some of the questions. A better approach would be to fill out the form while conducting the usual, relatively unstructured interview and to then ask the patient more structured questions to cover items missed during the initial phase of the interview. Finally, the authors of some psychiatric rating scales insist on independent ratings from two raters to enable the investigator to estimate the reliability of the two raters. Consequently, the raters are specifically instructed not to discuss the interview with the patient prior to completing their ratings. However, it is conceivable that more valid estimates of the patient's psychopathology might be obtained if the raters were encouraged to discuss their impressions of the patient and they then completed a single form where the ratings represented their consensus of the patient's interview behavior.

Validity

Simply stated, validity is a measure of the extent to which the test or scale actually measures what it purports or proposes to measure.

Predictive validity. This type of validity is generally of greatest concern and import to the typical user of a rating scale. If an investigator is interested in a particular outcome or criterion, he wants the scale to accurately measure this outcome. The scale should be sufficiently sensitive, for example, to reflect the differential effects of two or more treatments on outcome after three, five, seven, etc., weeks of treatment.

Inexperienced investigators often err in selecting a scale or test that has high predictive validity for the uses originally intended but has low predictive validity for the particular study of the investigator. For example, an investigator may be interested in measuring psychopathology in depressed patients but selects a scale originally designed for use with schizophrenic patients and that does not include many of the symptoms specific to depression.

Concurrent validity. This type of validity is concerned with the comparability of two sets of measures determined at about the same time. The extent to which scale scores can differentiate currently diagnosed groups of psychiatric patients is an example of this type of validity.

Content validity. Here the concern is with the representativeness of a selected sample of items randomly drawn from a parent pool to that parent pool.

Construct validity. The test or scale is designed to measure a hypothesis that is itself not directly testable. However, if the results with the test are consistent with the hypothesized results, this is considered an index of construct validity.

Norms

Unfortunately, few authors of rating scales for mental patients have reported norms for their scales. Further, the norms that have been reported are difficult to evaluate because they are generally based on small sample sizes and from one or a few hospitals. To date, the most dependable norms have been established by the Veterans' Administration based on the results of a number of large collaborative studies. However, research involving the use of rating scales can be carried out successfully without norms, provided the tests or measures have sufficient reliability or validity.

Rating Scales

Rating scales for measuring change in mental patients can be categorized in a variety of ways. These include the person doing the ratings, e.g., psychiatrist, nurse or patient, the patient population to be sampled, e.g., depressions or schizophrenias, the content of the scale, e.g., symptom rating scales or scales to evaluate

the patient's social and psychiatric history, and the format, e.g., ratings based on a structured or unstructured interview. For heuristic purposes, the selected rating scales to be presented in this paper were grouped on the basis of the person doing the ratings.

Psychiatric rating scales. In general, scales in this category are intended for use by either psychiatrists or psychologists. Some were designed with specific patient populations in mind and others may be used with a wider variety of psychiatric patients. The Hamilton Scale (Hamilton, 1960) and Beck Depression Inventory (Beck, 1961) are examples of instruments designed for a specific patient population, namely depressions. The Wittenborn Psychiatric Rating Scale (Wittenborn, 1955) and the latest version of the Inpatient Multidimensional Psychiatric Scale (IMPS) could conceivably be used with depressives as well as schizophrenics. However, there is no truly omnibus rating scale that is entirely appropriate for all patient populations. The Wittenborn Scale, for example, samples some ward behaviors and therefore is not suitable for outpatients. The IMPS is heavily loaded with severe forms of psychopathology and would not be too appropriate for rating neurotic or less severely ill patients. Some of these instruments are designed to provide a total morbidity score (the Hamilton and Beck Scales) whereas others provide factor scores in certain symptom areas. The IMPS, for example, provides factor scores characterizing 10 basic dimensions of psychopathology. Other rating scales such as the Wittenborn have also been factor analyzed. Most of these rating scales are completed following the usual mental status interview. Spitzer, Fleiss, Burdock and Hardesty (1964) developed a structured interview in which the interviewer asks the patient specific questions and his replies are coded as the interview progresses. In keeping with the times, a number of these scales have also undergone format changes to permit mechanical scoring and automatic transfer of the scores to IBM cards.

Nurse rating scales. Three scales were designed specifically to measure the patient's ward behavior. These are the Burdock Ward Behavior Scale (BWBS; Burdock, Hakerem, Hardesty and Zubin, 1960) intended originally for use with schizophrenic patients but recently adapted by NIMH for use with depressions, the Psychotic Reaction Profile (PRP; Lorr, O'Connor and Stafford, 1961) and the NOSIE (Honigfeld, Gillis and Klett, 1966). The PRP and NOSIE were designed mainly for rating schizophrenic patients. Factor scores are available for the BWBS and the PRP. The NOSIE consists of only 30 items and has not been factor analyzed.

In contrast to the psychiatric rating scales, which are generally rated following an interview with the patient, the ward behavior scales encompass a longer period of observation, generally one week. Consequently, it is important that these be completed by a nurse who is very familiar with the patient, preferably the patient's ward nurse rather than a nurse assigned to the research project.

Patient self-report forms. It is possible to devise a simple symptom checklist, suitable for use by either patients or psychiatrists. An example of such an instrument is the Symptom Checklist (Parloff, Kelman and Frank, 1954). However, in general, psychiatric rating scales contain sophisticated psychiatric terminology that makes them unsuitable for use with patients. A very popular instrument that is usable with patients and can be rated by psychiatrists or nurses, is the adjective checklist. The patient is asked to rate adjectives such as sad, nervous, and tense on a frequency of occurrence or intensity scale. Many of these checklists have been factor analyzed and factors characterizing anxiety, depression, hostility, etc., identified. The Clyde Mood Scale (Clyde, 1963) is a representative example. A number of adjective checklists also have multiple forms which make them preferable for use in repeated measurement of designs where the patient may be required to fill out the form on a daily basis (Zuckerman, 1960). A major problem with all patient report inventories is the tendency for the patient to rate himself either high or low in all areas of psychopathology. This tendency has been called the "sick set." Consequently, when the instrument is factor analyzed you tend to get one very large general factor reflecting this set. This set may be lessened by including items that reflect mental health and well-being as well as items sampling psychopathological behaviors.

Social worker rating scales. Generally, these scales are not designed specifically for use by a social worker but are intended to evaluate the patient's premorbid social and psychiatric history. However, traditionally they have been completed by a study social worker following an interview with a family informant. Obviously, if this data is to be valid it is important that the family informant be a close family member, and also be a reliable informant. Unfortunately, few family informants meet these criteria. For example, many wives have little knowledge of their husband's work adjustment and ability to get along with coworkers and supervisors.

Although investigators are generally aware of the need to have training sessions with psychiatrists and psychologists to assure reasonable reliability on the

psychiatric rating forms, they tend to overlook the need to hold training sessions with the study social workers. Consequently, these individuals often rate items such as the number of prior psychiatric episodes from quite different frames of reference. A recent innovation with social and psychiatric history records is the attempt to adapt these forms to facilitate transfer of the ratings to IBM cards.

One instrument, the Katz Adjustment Scale (Katz and Lyerly, 1963) was specifically designed for completion by a family informant. The informant rates a series of items indicative of mild, moderate, and severe psychopathology as typical or not typical of the patient "Now" and "All his life." This instrument has also been factor analyzed and some normative data are available.

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PROGRAM EVALUATION: A PROGRAM DIRECTOR'S VIEWPOINT

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Before attempting to fix responsibility for program evaluation, I think it might be appropriate if I try to define for you what I conceive program evaluation to be and what I think it is not.

I think of program evaluation as involving a continuing correction of one's program based upon analysis of oneself in relation to one's goals. I want to emphasize that to me program evaluation is not just running experimental studies. It is a *process* through which we make decisions concerning the steps which we take in reaching our goals.

At least three essential elements are required in order to carry on program evaluation. The first of these is *a statement of goals.* It should be noted that no program can be called purposeful without a set of goals, and if we think of a mental health organization as a purposeful program then it should be able to state its goals. We should recognize that a statement of goals is a difficult and time-consuming task, but one essential for any future evaluation of the program and a determination of its ability to function optimally. In mental health these goals must be as operational as possible to enable continuous evaluation and a determination of the degree of goal achievement or nonachievement to occur. It is one thing to state general goals such as "to restore the mentally ill to self-dependence and optimum well being" or "to prevent mental illness" or "to maintain a responsiveness to public need." Such goals are more directional than operational; they are not stated in a framework conductive to evaluation, short of subjective judgment.

My position is that these goals must by their very necessity become as quantitative as possible; that is, they must be quantitative standards which are indices of the more general qualitative goals. For example, it is one thing to say, "our goal is to prevent alcoholism"; it is quite another thing to say "I will reduce the incidence of alcoholism in a year by 25 percent for the entire population." The latter is more operational in evaluation. Not only should our goals be as operational as possible; they must not be confused with the methods devised to achieve these goals.

Goals may be stated at a variety of levels which would include overall organizational goals, goals of various subprograms, and even individual goals of the various participants. We should note again that general *qualitative* goals *are* desirable to give direction and scope but such goals become much more meaningful if quantitative indices can be developed for them.

While the statement and restatement of goals is an ongoing process, it is my recommendation that an initial and tentative set of goals be established by each subprogram and for the total program. Such goal statements can result only from directed, coordinated efforts involving participants according to various levels of responsibility. Both the definition of the program and the statement of goals are essential to effective evaluation.

We have said then that the first essential element for program evaluation is a clear statement of where you want to be, or your goals.

The second essential is a means to determine where you are now. This requires *feedback,* which represents the analysis of information about a system's behavior as a guide for future behavior. The existence of feedback presupposes that there exists first an information gathering capability of the program and secondly, an ability to analyze information. The development of feedback capabilities in a mental health system should be built on both abilities, for comprehensive information is essential to any purposeful program which seeks optimal or "best possible" behavior.

Information analysis incorporates the logic of any feedback capability. It makes all unstructured messages meaningful and useful information. It is important to recognize both the ability to gather and analyze information.

The third element needed in program evaluation is *logical decisions* as to how to reach the goals that you have set. Decisions about goals, indices of goals, corrections which are necessary to make our activities more

goal directed—are the fabric of evaluation, the raw material on which all other activities identified as evaluation are based. Because this is so, it is well to emphasize that evaluation as a decision task lies squarely in the administrator's area of responsibility, not something which can be scuttled off to the side by giving "evaluation" responsibilities to a research or another staff person.

Essential to the decision making process is a network to gather and disseminate the messages needed by the program to properly function. An important part of this component is the determination of the information needed by each decision point, with a concerted effort to make such information as relevant and as current as possible. No decision maker can operate effectively with information that is old or lacks currency. He can hardly make decisions about the kinds of activities needed in a particular community to meet the mental health needs unless as much information as possible is available about the problems that exist in the community, about available resources within the community to meet these problems, and about the general social-cultural structure in which any formal effort at meeting these needs must be incorporated.

A program of message retrieval and dissemination is largely dependent upon the types of program definitions and goal statements which have preceded any serious involvement in a total message network. A large part of this program should be directed at seeking innovative means to carry out this function. The high-speed computer has made it possible for a decision-maker to have available comprehensive and detailed information about the decision situation and obtain such information as rapidly as possible. But simply to put on a computer those things we are currently doing in the way of statistics and data analysis is to assume that such data are the most meaningful that can be produced. Such efforts often tend to complicate our own ignorance about what it is that we do and do not know about ourselves; that is, do what we do incorrectly much faster. It is my belief that no comprehensive efforts at use of high-speed computers should be made until serious inroads have been made—in defining our program and stating its goals. It is clear, however, that program definitions and goal statements may be facilitated by a more meaningful presentation of available statistics, but such effort should be looked upon as simply stop-gap.

I think we all recognize that evaluation for mental health or other related service organizations involves unique problems which are not characteristic of, say, a free enterprise industrial concern. In evaluating its goal achievement, industry turns to its profit-loss statement. If that statement is running in the black and if the stockholders are making a fair return on their investment, the industry can be regarded as achieving its goals. We in mental health, on the other hand, have not yet evolved a strategy for defining our goals. Indeed the very size and complexity of our operations discourage us from searching for an operational definition of our program, a definition that we can evaluate.

I think the time is coming, however, and may even be upon us, when we are going to be expected and required to account to the people through their governmental leaders in a much more precise way for the efficiency or the inefficiency, with which we are spending our tax funds for mental health programs. In order to do this effectively, we are going to have to press on with the difficult, complex, and often dirty business of making evaluation an integral part of all of our programs.

Inasmuch as we have very little precedent for the process of evaluation in this field or any other service field for that matter, we must be prepared not only to engage in the painful process of setting goals but we must be willing to change as a result of our own evaluative findings. This is perhaps the most difficult thing for a service agency to do, since we have a very long tradition of expansion but not much tradition of direct change, including amputation if necessary.

With this as background, I am ready to turn now to a discussion of whose responsibility program evaluation is.

It seems obvious to me that there are several different levels of responsibility in evaluation and that a number of different disciplines will necessarily be involved. Speaking from the standpoint of a State commissioner of mental health, however, I have a responsibility for creating the kind of atmosphere wherein the process of program evaluation can begin to take place at every level up the line to the local level of operation. I think it is essential that goal definitions begin first at the top level in order that programs at other levels can set their goals which are compatible with those of the goals and objectives of the statewide program.

I also believe it wise to have a State-level professional who can coordinate the planning and evaluation process and provide direct consultation to the State program administrator. It would seem important to keep this person free of direct involvement in evaluation, although he might become involved in some pilot efforts, in order to get the process started. I would

compare his function more to that of the skilled mechanic. Like the automobile mechanic, the State-level evaluation professional keeps the machine in repair and running at top efficiency but he does not actually drive the car. He acts as the catalyst who precipitates the evaluation process, and who remains on call for maintenance and help if trouble develops.

Moving from the State-level organizational structure, I can see the need for a group at the next level whose responsibility it would be to get down to the nitty-gritty of program evaluation. These people would be assigned areas of responsibility either on a regional basis or according to broad program areas—children, adolescents, alcoholics, adults, geriatrics, etc. They would relate to the State-level evaluation consultant, and at the unit or patient level to that program administrator (i.e. the hospital unit director, the community clinic director, etc.). It is my belief that most of these program administrators are so burdened with the day-to-day responsibilities of program administration that they do not have time to initiate the evaluation process. So without trained people having clear responsibility to involve themselves with program administrators in the tough work of goal definition, development of informational channels, and decisionmaking, I am afraid that the evaluation process will never become an integral part of our total mental health system.

I would not limit the evaluation professionals to a task orientation only. I suggest that they be seen as information seekers, organizers, and disseminators as well. This would include efforts at educating all professionals in the notions of decisionmaking; the conceptual schemes for organizing data, such as statistics; the philosophical issues surrounding our goal statements; as well as organizing and maintaining the sources of information on which evaluation decisions can be made.

This is not to say that the subprogram administrator does not have some very definite responsibilities in this area. First, he must be sold on evaluation as a process and must be willing to give this his wholehearted administrative support, communicating this to his staff. He must be willing to devote time and real soul-searching effort to defining as specifically, as concretely and as quantifiably as possible what his program is trying to do for the patient; in other words, what his goals are. The administrator must be willing to aid in the search for criteria that will give leads on whether or not the goals are being achieved. And finally, he must be flexible enough and willing to modify his program in light of the findings of the evaluation process.

The third and equally important member of this evaluation triad is the statistical analyst. I would see the statistician, in the same way as the evaluator, relating either regionally or to the broad program areas (children, adolescents, adults, etc.). In some cases, the roles of the evaluator and the statistical person might blur, where you may find, for example, a person skilled in evaluation who also is a good statistical analyst. One significant role of the statistician is that of data analysis, directed especially toward measuring criteria which will reflect program effects.

In closing, let me stress the need for an organized and systematic effort to implement evaluative processes. Since this is rather new to us in mental health, it should be phased in order to work progressively and meaningfully to larger and larger spheres of application. Certainly, its introduction should be accompanied by orientation. Administrators need to understand the logic on which evaluation is based rather than something "handed down from above." As efforts to formally evaluate, extend further and further into the total organization, they should always be preceded by education.

The structure which I have outlined is not necessarily the only one wherein program evaluation can take place. I am sure that others of you will approach this differently, depending upon the uniqueness and variability of your own programs. I do think, however, that in whatever ways we may implement it, program evaluation must begin to permeate the entire mental health system. Only through this process can we begin to respond to the mandate which we are being given to optimize our operations in behalf of the mentally ill, the alcoholic and the mentally retarded and to obtain the desired sensitivity to the mental health needs of our communities.

THE STATISTICIAN'S ROLE IN PROGRAM PLANNING AND PROGRAM EVALUATION

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The role of the statistician in program planning and evaluation vis-a-vis the administrator and the planner/evaluator may be viewed in terms of effectiveness as a team member. However, we should recognize that inappropriate participation in pseudo program planning and program evaluation occurs. A few of those who participate thusly call themselves researchers or statisticians; others call themselves planners; others, evaluators; and still others, administrators. Planning and evaluation are trumpeted about noisily by many who see (and observe) little, write much, and blat more. The overlooked ingredient is that effective participation is not always equatable to mere observable participation.

Effective participation of statisticians in program planning and evaluation requires that we be aware that effectiveness may well be dependent upon the bases of power in decisionmaking. Interrelated, but with more specificity to statisticians, are the following: the effects of motivation and competence; working knowledge of both technical and general subject areas; and ability to provide useful consultation.

When decisionmaking involves more than one person, as is true in both program planning and program evaluation, participants should be aware of what constitutes the bases for the making of decisions. More than 20 years ago I read some of Max Weber's writings which developed the idea of a trichotomy: traditional, charismatic, and bureaucratic authority. Subsequently, other writers have enlarged upon the concepts and added other dimensions. Much may be found in works by such authors as Chester Barnard, Peter M. Blau, Theodore Caplow, Peter F. Drucker, Amitai Etzioni, John W. Gardner, Jerald Hage, and C. Northcote Parkinson. Recently, A. C. Filley and A. J. Grimes(*1*) identified a number of bases of power by studying questionnaire and interview responses from employees in a nonidentified, nonprofit professional organization. The study elicited responses in terms of perceived, preferred, and utilized organizational structure. Hypothetical case situations were described and followed by three questions:

1. To whom should you go for permission, consultation, decision, etc. (depending upon the situation) and why? This related to the perceived organizational structure.
2. To whom would you like to go for permission, etc., and why? Preferred organizational structure.
3. To whom would you in fact go for permission, etc., and why? Utilized organizational structure.

Filley and Grimes delineated 12 bases of power; interestingly, none related to charisma: (*2*)

1. Formal authority. There is actual or perceived legitimacy.
2. Responsibility and function. Responsibility for an activity may or may not be associated with a job title.
3. Manipulation. The decisionmaker will take some type of action seen as desirable by the requester.
4. Default or avoidance. Another appropriate or desired source of decisionmaking is not available.
5. Autonomy. The respondent does not feel he has to see anyone else.
6. Expertise. The decisionmaker is felt to be closer to or has better knowledge of a situation, or he has special ability.
7. Control of resources. The decisionmaker controls money, general information, procedures, etc.
8. Bureaucratic rules. Policies, regulations, channels, etc., are already established.
9. Traditional rules. Reliance is placed upon custom or seniority.
10. Collegial. Decision is made through consultation with a group of peers or through some kind of group action or participation.
11. Friendship. The respondent has personal relationships or feelings of good will toward the decisionmaker.
12. Equity. The decisionmaker is known to be fair in dealing with problems.

Classifications appropriate to statisticians probably would include formal authority, responsibility and function, expertise, control of resources, collegial, friendship, and equity. Of that group, statisticians may be best able to increase the bases of power relating to expertise, collegial, friendship, and equity. (Of course, the statistician should bear in mind the fact that authority is not the same as leadership. Leadership is more difficult to exert than authority. No one has to follow a leader; he may or may not have legitimacy; a leader can only ask while the person with authority can require.) The statistician becomes increasingly effective as he acquires reputation for having expert knowledge and being equitable. Through the collegial process and through demonstrable actions, he can build the basis for improved personal relationships with the administrator and the program planner/evaluator. He can also simultaneously pave the way toward increasing power bases relating to responsibility and function. Thus, he can take advantage of his knowledge of the bases of power in decisionmaking. The end result will be that he will play a more effective staff role in program planning and program evaluation.

More specific to the statistician and related closely to the development of expertise are considerations of the effects of motivation and competence; technical knowledge relating to statistics and research; general subject knowledge, and the ability to provide consultative services.

Motivation has been defined by George Huber (*3*) of the University of Wisconsin College of Engineering as being "The inclination to satisfy a need . . . (and) . . . in part a function of the professional's previous experiences which have shaped the hierarchy and intensity of his needs and the perception he has of his ability to satisfy these needs." Huber posits that the level of general motivation can be increased. He suggests that this can be accomplished by meeting or exceeding other than trivial goals and by minimizing the cost of failure. The statistician may raise his own general motivation, then, by setting and meeting goals which are realistically commensurate with his current abilities and functioning. He can force his level of aspirations in an upward direction without outside intervention. (*4*) Hopefully, as successes are met, upper administrative levels will become aware of such successes and help to reinforce the positive attitudes which will accrue. Of interest to us is Huber's proposition that "people increase the range and strength of their coping efforts if their role requirements are great."

Competence relates to the ability to carry out assignments satisfactorily. For statisticians that means problem solving in statistics and research and effective exercise of interpersonal relationships. Problem solving requires good utilization of both technical and general knowledge. We should apply an orderly research approach (viz., state the problem in researchable terms; make preliminary observations and find out what others have done about the problem; develop hypotheses or ways of meeting the problem; decide on methods, timing, costs, etc.; and then carry out the plans). All that is easier said than done and was so recognized in a paper (*5*) presented during the October 1967 Southern Regional Conference on Mental Health Statistics. However, application of an orderly research approach coupled with mastery of technical knowledge is not enough to meet needs demanded by evaluative research. Basic conceptualizations must not be faulty or too narrow; a comprehensive study must not be designed when only a limited amount of data is needed to answer specific administrative questions.

The statistician must exercise both judgment and tact when working with others in eliciting what is really needed when program evaluation studies are being planned. Subsequently, he must be able to exercise a considerable amount of flexibility in that he will probably lose "control over the research situation . . . (in that) . . . someone else, usually a program administrator with a strong vested interest, has already defined the objectives of the program to be evaluated. To force him to question the underlying assumptions of these objectives is both difficult and painful." (*6*) Another consideration was pointed out by Levy, Herzog, and Slotkin. (*7*) "One of the first requirements of evaluative research in a State agency context has been the need to develop a conceptual model of the evaluation process so as to avoid being overwhelmed by the enormous variety of data that affect our activities. We have found that conceptualizing evaluation as one element in a systems process model is helpful in providing an overview." Thus, in the current situation, competence in evaluation research relates to knowledge and application of systems theory.

It appears that the longer we are in this business of being mental health statisticians, the more we have to know. Our work now requires that we have knowledge in such areas as statistics, probability theory, systems analysis, and computer usage. In Wisconsin we are being swept along by the tides of systems analysis and computer utilization; we are being forced to add to our technical knowledge; we are learning. Part of what we are learning was succinctly summarized in a

recent issue of *Business Automation.* (*8*) Some of the basic problems in making a total management information system work were categorized as follows:

"1. Overabundance of irrelevant information—tendency to fail to isolate the key factors.
"2. Insufficient planning or development—tendency to push for results too quickly.
"3. Oversophistication—lack of a complete understanding of the system by those who must make it work.
"4. Overconfidence—temptation to visualize the MIS as . . . an answer for all problems."

Also pointed out was the assertion that inadequate involvement of top management in all phases was "probably the one single factor that has brought failure or disappointment in many attempts . . . ." Thus, effectiveness requires more than utilization of technical knowledge; it requires knowledge of group dynamics and of general information in the field of mental health.

Without general knowledge in mental health areas, we statisticians will encounter numerous barriers in communicating with mental health practitioners, administrators, and planners. We shall be unable to maximize our areas of expertise. We shall have difficulties conceptualizing program evaluation models and visualizing measurable program objective. For example, we should be aware of the shift in focus of mental health treatment delivery simultaneously toward and away from private practice. For most patients there is a decreasing reliance on utilizing private practitioners (despite sliding scales for fee payments) and more on "public funding, public program development, public institutions as the main vehicles for the delivery of care." (*9*) We should also see the move toward specialization of professional services as well as the move in delivery-of-service concepts from the special to the general, i.e., from providing services to defined groups (such as the mentally ill) to providing services to almost the full population. Definitions of who should receive services are constantly being broadened because of a variety of societal and other influences. Another rather obvious shift in focus is that paralleling public health—concentrated attention upon providing overt preventive measures in addition to palliative services. That is in recognition of the fact that control of disabilities or diseases cannot be accomplished merely by treating the disabled or diseased.

The statistician's role in program planning and evaluation is that of a consultant in addition to that of a team member. As a team member, the statistician may decide that considerations relating to the power bases for decisionmaking are germane. As a consultant, he knows that although he makes recommendations, he does not necessarily enter into actual decisionmaking—not even in all subject areas specifically within his apparent domain of expertise. Therefore, he should be acutely and constantly aware of the difference between the two roles even through his role relationships may change from one to the other and back again during and between meetings of groups with which he works.

As noted earlier, for successful participation in program planning and evaluation "a relatively high degree of agreement is desirable between the expectations of the researcher and those of the agency." (*10*) Experience teaches us that usually practitioners, administrators, and planners are interested in methods which will result in quick action and, even more, in favorable findings. They are not especially interested in furthering knowledge, although they want and expect the statisticians to be knowledgeable about others' works. On the other hand, introspection will reveal that we statisticians may strike the practitioners, administrators, and planners as being overly concerned with methodology and with keeping an intact research design (almost an impossibility in most administrative settings). Thus, in studying his role the statistician must recognize that in emphasizing the theoretical significance of his work and in maintaining rigorous controls with respect to research methodology, he may not be giving proper perspective to eventual utilization of findings by the agency providing client services. A middle course of action becomes mandatory in the case of program evaluation. Compromises must be made, but they should be carefully considered with respect not only to meeting current needs but also to anticipating future ramifications. There must be recognition of theoretical and other factors which cannot be compromised.

The primary focus of this presentation has been to discuss the statistician's role in program planning and program evaluation from the viewpoint of enhancing effective participation. A review of bases of power in decisionmaking disclosed that the power base most amenable to personal intervention and most related to effective participation was that of expertise which I chose to describe in terms of motivation, competence, technical knowledge, knowledge of the field of activity, and provision of consultative services. Development of that base of power can lead to development in other power bases and, therefore, to subsequent expansion in decisionmaking power for statisticians.

Some of the relationships between knowledge and power were examined by Kary Hyre in an unpublished

paper (*11*) in 1968. He noted the importance of maintaining balance among problem areas and being aware of the integrative nature among them. In that context Hyre asserted axiomatically, "When too great an amount of time is spent in one problem area, then the time necessary for solving problems in other areas is too severely limited." In transforming that assertion to fit our current considerations, we must recognize our need to expand our expertise according to a planned approach. We cannot focus our attention completely on technical knowledge areas. We cannot become exclusively engrossed in behavioral dynamics relating to motivation and competence. We cannot expend inordinate amounts of time reading mental health journals and discoursing the mental health practitioners. Yet, we must advance in many areas almost simultaneously. That will require considerable examination, evaluation of needs, priority setting, planning, and administrative encouragement.

Finally, through effective provision of research and statistical consultation (taking into account the appropriate utilization of expertise), the statistician can contribute much toward achieving goals he shares with the administrator and the planner-evaluator. That will lead to collective approval which, as Peter Blau (*12*) states, ". . . legitimates leadership. The abilities that enable a person to make major contributions to the achievement of a group's goals command respect. The respect of others for him prompts them to follow his suggestions, since they expect to benefit from doing so . . . ."

The challenge to statisticians is clear. Can we individually do anything about it?

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THE PLANNER-EVALUATOR ROLE IN A STATE DEPARTMENT OF MENTAL HEALTH

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A formal planning mechanism for the Department of Mental Health was institutionalized in the State of Illinois in 1964. At that time, a division was set up in the Illinois Department of Mental Health called the Division of Planning and Evaluation Services. This was a new division which was set up initially under the impetus of Federal funds that were available for a 2-year planning project in mental health. However, at the outset, the intention in setting up the division was that it would be a permanent division, an integral arm of mental health and when Federal funds expired, it would become a regular part of the Department's biennial budget.

Planning was defined at the outset as a global process which encompassed a wide range of activities. This included conceptually the choice and establishment of planning objectives, the development of data and information systems to supply data with regard to the planning objectives and examination of alternative paths of implementation of planned objectives. The evaluation of the implementation of these objectives and following this, a corrective replanning cycle which carries us once again through the steps of setting objectives, gathering information, implementing programs and once again evaluating them was incorporated as part of a systems model for planning.[1]

The division's functions at the outset were divided into two general kinds of activities. These could be referred to as intramural and extramural planning. Extramural planning took the form of setting up an independent voluntary planning apparatus to do long-range planning in mental health for the State of Illinois which would be representative of the many interested groups in the State who inevitably would have to be involved in such a process. This was a first priority item because Federal monies which would shortly become available to the State under the provisions of Public Law 88–164 required that a comprehensive State plan be compiled. This long-range programatic plan was seen to be the function of an extramural planning group rather than a function of the Department of Mental Health. This is understandable in the light of modern conceptions of mental health which conceive of mental health as having much broader scope than the question of the treatment of the mentally ill per se. Planning for mental health was conceived of as a process which would involve many different agencies both public and private, and integrally involve such areas as education, public safety, public health, vocational rehabilitation, public aid, children and family services, and many other agencies outside the purview of the Department of Mental Health. Consequently, in the fall of 1964 the Illinois Mental Health Planning Board was established with certain advisory councils. These councils originally numbered six, but over a period of time they were reduced to three. The three which remained were the Universities Council, Professional Societies Council, and the Council of State and Federal Agencies.[2] In 1967 the planning board and its three advisory councils became a statutory body charged with long-range planning for mental health and mental retardation in the State of Illinois.

The Planning Division of the Department of Mental Health took a very active role in setting up the board and councils and has continuously given staff support to these bodies and the various task forces originating from these bodies. As time went on, the administrative separation of the planning board and its councils from the Department of Mental Health became more clear-cut and was eventually formalized in 1967 when the planning board achieved statutory status and appointed its own executive secretary. The department's Planning Division then moved to a consultative and

[1] See Division of Planning and Evaluation Services progress reports for years 1964, 1965, 1966, and 1967, Illinois Department of Mental Health, Division of Planning and Evaluation Services, Chicago, Ill.

[2] See Progress Reports 1, 2 and 3, Illinois Mental Health Planning Board, Chicago, Ill.

advisory function supplying the board and councils with data and conceptual expertise on their request. The Director of the Division of Planning and Evaluation Services, together with the Director of the Department of Mental Health have sat continuously as ex-officio members of that board.

The intramural functions of the Division of Planning and Evaluation Services gradually crystallized into four general areas of responsibility within the Department of Mental Health. These programatic areas may be labeled: (1) Planning support and consultation, (2) program evaluation, (3) social research, and (4) data collection and analysis.

PLANNING SUPPORT AND CONSULTATION

This is a function for which the major responsibility is divided among the division director and two assistant directors who have been trained and have broad experience in the area of community organization. Our general objectives here are the development of community-based comprehensive community mental health programs in the various geographic areas of our State which have been designated as zones. Connected with this effort are the development of the State mental health and mental retardation construction plans, consultation on zone and subzone planning, participation in and preparation of Federal grants under Public Laws 88–164 and 89–105 and work on various community development problems such as the passage of mental health referenda under House Bill 708. Through the Planning Division, staff support for internal departmental planning of program is available upon request. This staff support goes freely either upwards or downwards in the department's bureaucratic structure. Thus, the Planning Division offers staff support to the director and his special assistants, but also to the zones, the zone directors, their staffs and the directors of various institutional programs. One major recent instance of the planning support function was the recent development of a plan for the delivery of services in the Chicago metropolitan area initially referred to as Metrozone.[3] This rather complex rational plan for the delivery of services and the allocation of departmental resources throughout the Chicago metropolitan area was largely the outcome of a collaborative effort among four people. These were the director and assistant director of the Planning Division assigned to the Chicago Metropolitan area, a special assistant to the Department director, and an outside university consultant. As the basic plan took form and as Metrozone moved from planning to implementation, all four of these principals dropped out of the picture completely and a whole different group of people took over the implementation under a newly appointed Chicago area zone director.

Other functions associated with planning support and consultation are, as mentioned above, the staff support to the Illinois Mental Health Planning Board and its affiliated councils and a multitude of liaison functions with other State and Federal agencies, coordinating mental health planning with parallel planning efforts such as under the Model Cities Program and under the Partnership for Health Legislation, Public Law 89–749.

PROGRAM EVALUATION

This aspect of the division's program functions under the leadership of the chief of program analysis and evaluative research who is directly responsible to the division director. This person, who is a statistician with additional background in the behavioral sciences, is supported by a small staff and in collaboration with the data collection and analysis program, develops models for evaluation for all facets of the department's program. The program evaluation unit functions mainly on the basis of monitoring statistical reports furnished through the data collection and analysis unit. The program evaluation unit monitors operating statistics in an effort to provide meaningful commentary on the department's current and past state of operations. This continuing commentary dealing with such topics as patient movement data—that is, admissions, length of stay, discharge, readmissions, etc., significantly affects both the administration and future planning of departmental programs. The program evaluation unit also functions to maintain contact and consultation with other program evaluation units situated in the zone centers and State hospitals, and has provided a manual on basic principles of evaluative research.[4] This unit has not, up to the present time, attempted to do controlled evaluation studies. This level of evaluation has been delegated to the zone staffs, each of whom has the potentiality of developing a local program evaluation unit. Thus, the Planning Division's evaluative function, up to the present time, has been defined mainly in the area of epidemiological surveillance.

[3] Metrozone, the Chicago Area Plan for Mental Health Services, October, 1968, Illinois Department of Mental Health, Chicago, Ill.

[4] Manual for Evaluation of Mental Health Programs, May 1, 1966, Illinois Department of Mental Health, Division of Planning and Evaluation Services, Chicago, Ill.

SOCIAL RESEARCH

This unit, principally staffed by three behavioral scientists and supported by research analysts and clerical staff, performs epidemiological and demographic research principally related to the general area of program development. Each of the behavioral scientists is directly responsible to the division director in terms of his ongoing research activities. Much valuable output has already come from this unit, studying such topics as the structure and organization of our State hospitals, analysis of community variables relating to admission to State hospitals, relation of population density to the occurrence of psychiatric casualties, etc. The behavioral scientists, while encouraged to work collaboratively with each other, with the division director and with other members of the Planning Division staff, are allowed considerable autonomy in terms of selecting research projects on which they wish to work. Their research is of an applied nature and in the final analysis, must be capable of demonstrating some link with program development and program planning. However, within these very broad constraints, they have considerable freedom to select problems which interest them and which suit their particular area of expertise.

DATA COLLECTION AND ANALYSIS

The Planning Division, although established de novo, was nonetheless not without responsibility. One considerable responsibility was to take over the direction of the statistical research unit which had been previously in the department's administrative section. This unit was concerned primarily with supplying the NIMH biometry section with annual patient movement statistics and preparing various routine statistical reports. At the time this organizational change was made, the section had become almost moribund, delivering its reports anywhere between one and two years late. Obviously, no immediate improvement could be accomplished since it is quite difficult to overcome the degenerative process once it sets in, in a statistical reporting unit. What happens is that a general malaise overtakes the unit as well as the persons providing the information and as a result, the data collected becomes increasingly degraded both with respect to quality and timeliness.

About the same time that the Planning Division was established, or perhaps a year earlier, the department decided to transfer its data-processing operations from unit record equipment to a tape computer system. The decision was made to obtain a Burroughs B–280 computer system. As you may well imagine, this created considerable pain both organizationally and to the employees since the first and most serious problem which resulted was late payrolls and late billing of patients. Therefore the need to computerize the patient statistical operation became of secondary importance so that patient statistics continued to be maintained on a manual and punched card basis. This meant that analysis of the statistical data could only be made at the end of the fiscal year when the files could be frozen for analysis. Thus, one initial aim of the Planning Division was to computerize the patient recordkeeping activity in order to provide more timely data. This, however, could not be done without sacrifice. The sacrifice that was made was to also take on the responsibility of running the rapidly deteriorating data processing function. The solution was to combine the statistical research unit and the data processing section into a new section with the name of the Management Information Section. In retrospect, from the point of view of improving statistical reporting, this now seems to have been a monumental mistake. We did, in fact, substantially improve the functioning of all management information systems, but since they always had a higher priority, we neglected even further the statistical reporting systems. There is perhaps a useful moral here, namely, "Do your own Thing." An additional organizational moral which follows from this is that one should avoid deploying limited resources too widely or nothing useful may be accomplished. The slogan here is "Be a fanatic" if you want to accomplish something substantial. It would appear that if we had concentrated all our efforts on improving the statistical research function and let the other management information needs be met as best they could by others, we would have done what we knew best more effectively and in the long run achieved much more. That is to say, we would have been more like NASA than NIMH—more concerned with achieving one big thing well regardless of duplication, expense and conflict than with many small things inadequately. Thus in a real sense, we are still using first generation concepts (patient movement statistics) with second generation programs (COBOL) and file concepts, on a third generation computer (IBM 360/40).

Like many people in government service, we were also bemused by the siren song of program budgeting. We devoted a considerable amount of our limited resources and time to developing a program budget chart of accounts and coding employees (or po-

sitions) and other items of expenditure by this new coding scheme. In addition, we implemented it as an information and control system. Unfortunately, it has never worked adequately for a very simple reason; nobody ever took it seriously enough to make financial decisions on the basis of this information. So the data has become increasingly degraded. In addition, as with many planning efforts, management was in a hurry to implement the system so that we approached the problem from the wrong end. Rather than making a detailed analysis of the actual activities within the facilities, we started with the programs and on the basis of logical analysis defined, the activities. This resulted in a failure to involve adequately the institutional staff in the process of defining their programs and resulted in a very logical, complete and generally useless chart of program accounts. In addition, it turned out that this was not really what was wanted. What was actually required was a cost accounting scheme showing cost responsibility centers and a statistical reporting system on patient and staff services that could relate performance to budget. Since to do this latter is extremely expensive and complicated, we did the simpler and cheaper thing which turned out to be unsatisfactory. There is another moral here. The advantages of quick gimmicky solutions over honest toil are very short-run advantages. We did, however, computerize the statistical patient information system and designed an integrated payroll personnel reporting and control system.

From the above brief discussion, it should be evident that the Planning Division is staffed by persons with diversified talents. This is intentional and in keeping with the stance which the division has tried to develop, of maintaining a generalist function. We like to think of ourselves as a general resource, for the department and for the planning board, for consultation and staff support in a wide variety of areas which pertain to the planning and evaluation process. There are several other comments which ought to be made in conclusion about the Planning Division and its relation to the rest of the Department of Mental Health. First, one ought to note that we are a staff division, which means that we have no line authority or responsibility for the actual service delivery system. It is not even mandatory that we be involved in the planning of any specific service delivery system. The Illinois Department of Mental Health is a highly decentralized department. Each zone is a microcosm unto itself. The zone director is a local district director of mental health. There are very few points of mandatory interaction among the zone directors and the Planning Division. One such point of mandatory interaction is on the topic of the content of a statewide data collection system on patients. Most of the contacts, however, are voluntary and most often made at the request of the zone director. The director of the department, however, has made extensive use of the Planning Division in attempting to formulate policies and answers to problems which have a statewide implication. It is natural that he should do so because each zone director and each zone staff has an orientation only towards a particular portion of the State. The Planning Division has no particular vested interest in any one zone.

Secondly, it should be noted that the planning division has been consciously constructed as a division which will change its structure and function rather continuously in accommodating to changes in departmental functioning. One example of this has to do with the role of the assistant division directors. These men, as noted previously, are highly trained in community organization. When the Planning Division first came into existence in 1964, none of the zone staffs had community organization people to work in the communities. Thus, at the beginning, these two men very often worked as community organizers in zones, working towards implementing various departmental objectives. This function has gradually changed because the zone staffs have employed their own community organization personnel. Today, these men function much more in the role of planning and community organization consultants and do very little direct community organization work for the department. Another example of the transitional nature of the division's role has to do with management information. This function, as indicated before, was gradually appropriated by the division out of logical necessity over the first year and one-half of its existence. However, it has never been considered necessary or even appropriate that the Planning Division actually run the management information operation. With regard to the management information section, the Planning Division is a consumer like many other people in the department. The Planning Division has helped to develop the management information function to a point, at the present time, where it functions pretty autonomously as a separate unit. It is quite conceivable in the near future that this section may achieve separate divisional status or move to some other structural position within the department.

As a third and final point, it should be noted that if the Planning Division has any content function as such, it might be defined as an orientation towards the development of comprehensive community mental

health programs on a highly decentralized level. Thus, the division quite naturally takes an interest in the proper implementation of such legislation as Public Laws 88–164 and 89–105 and other related legislation which enables the establishment of local comprehensive community mental health centers.

The Division of Planning and Evaluation Services of the Illinois Department of Mental Health has, in a sense, been an interesting and instructive experiment. The experiment is now entering its sixth year. The issue is no longer whether planning and evaluation have a function in such a department, but rather how one optimally fits such a function to a large and complex agency. Our way as outlined in this paper is but one of several conceptual models which have developed in the country.

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